DIABETES 2000

Recommendations for a Strategy on Diabetes Prevention and Control in Saskatchewan

Report of the Saskatchewan Advisory Committee on Diabetes

March 15, 2000

Dr. David Butler-Jones
Chief Medical Health Officer
Saskatchewan Health
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Regina SK S4S 6X6

Dear Dr. Butler-Jones:

On behalf of the members of the Saskatchewan Advisory Committee on Diabetes, we are pleased to present our recommendations for the development of a viable strategy on diabetes prevention, care, treatment and support for your consideration.

The committee has attempted to ensure that, within its budget and within its mandate, it has provided you with the most comprehensive information possible on current services and prevention research. We have reviewed the issue from a broad multi-disciplinary perspective and have concluded that, although formidable and complex, a population health approach to the disease is likely to provide the basis for the development of an optimal system.

There are several key areas that warrant highlighting.

- **Care, treatment and support of persons with diabetes**. Persons with diabetes must have access to high quality, comprehensive services to assist them and their families with the treatment of the disease. Effective treatment will not only lead to improvements in short-term quality of life, but also to a reduction in the devastating long-term complications of the disease.

- **Case finding of undiagnosed people with diabetes**. National and international studies have shown that a significant percentage of persons with the disease remains undiagnosed. Special efforts must be made to identify these persons so that they may be offered appropriate treatment for the disease.

- **Prevention of the development of diabetes**. In a large percentage of Type 2 diabetes, which accounts for about 90 percent of all cases of the disease, there is good evidence that a substantial proportion can be either prevented or delayed in its onset. Strong coordinated and population-based efforts must be developed to reduce the growing numbers of members of the general population and high-risk groups who are being afflicted with the disease.

- **Disease surveillance**. Surveillance is crucial for disease identification and control. Specific surveillance resources must be made available for accurate assessment of the burden of disease in society. Successful efforts will also permit more accurate assessments of the effectiveness of interventions being carried out.

- **High-risk populations**. Certain high-risk populations have been identified both in the literature and in this report, in which the rate of disease and its complications are disproportionately high. Special efforts should be directed at these particular populations to prevent or lower the frequency and severity of complications.

The Advisory Committee on Diabetes is of the opinion that the recommendations contained within this report, if acted upon, will lead to a more coordinated and comprehensive approach to the challenge of diabetes. The committee specifically cites Saskatchewan Health's role in partnership with other government departments such as Education, Social Services and Municipal Government, health districts, Health Canada, Aboriginal Health organizations, non-governmental organizations and other stakeholders as essential to the success of a well-integrated diabetes strategy.

Yours Sincerely,

Dr. Mark A. Boctor, Co-Chair,
Advisory Committee on Diabetes

Dr. Eric R. Young, Co-Chair,
Advisory Committee on Diabetes

DIABETES 2000
REPORT OF THE
SASKATCHEWAN ADVISORY COMMITTEE ON DIABETES

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Diabetes is a serious chronic disease that affects about four percent of all Saskatchewan residents. In 1996 there were over 38,000 people diagnosed with diabetes living in the province. This number is currently growing by about 1500 per year, so by the end of 1999, we can estimate that total was about 42,500. Added to this, is also an unknown number of persons with undiagnosed diabetes. The disease rates increase with age and are disproportionately high in Aboriginal peoples. The human and economic costs of diabetes are significant and tragic.

The Saskatchewan Advisory Committee on Diabetes

The Saskatchewan Advisory Committee on Diabetes (SACD) was initiated in May of 1997 by the Saskatchewan Minister of Health in response to the increasing number of people with diabetes in Saskatchewan particularly among Aboriginal peoples and senior citizens. Committee members were selected for their expertise, interest, experience and perspective about people with diabetes and diabetes health care.

The vision of the committee is to provide the Chief Medical Health Officer with recommendations which, when implemented, will lead to a reduction in the incidence of diabetes, a reduction in the complications of diabetes, and improved access to education and treatment services for all people with diabetes in the province.

The Mandate

The committee was asked to provide a report to the Chief Medical Health Officer that would:

- Identify, summarize, review and evaluate diabetes services currently available to Saskatchewan people within the province;
- Recommend strategies in keeping with a population health promotion approach, for educational, preventive and treatment services addressing diabetes, which meet acceptable standards and which are feasible within available resources;
- Recommend research approaches aligned with the recommended services, which would ultimately serve to demonstrate the efficacy and cost-effectiveness of the recommended strategies;
- Identify an optimal system(s) of health service delivery for people with diabetes.

The committee did most of its work, including writing the report, in four Working Groups, which drew their members from the Advisory Committee as well as adding external experts when necessary. These working groups dealt with the following broad categories:

- Database Development and Epidemiology;
- Aboriginal Issues;
- Primary Prevention;
- Education, Care and Treatment.

Most of the committee members represented various organizations. However, their opinions and recommendations are not necessarily those of the organizations they represent. Advisory Committee members provided opinions and recommendations, which in their view, would provide a coordinated strategy for diabetes prevention, education, care and treatment. The committee worked in a collaborative and inclusive way, and recommendations were developed by consensus of the majority of members.

International Context

Saskatchewan is not alone with its increasing number of persons with diabetes. The World Health Organization (WHO) reported in 1994 that there were 100 million people diagnosed with diabetes in the world and estimated that by the year 2010 that number will increase to over 230 million. It is estimated that globally, there are many undiagnosed cases of diabetes.

National Context

Health Canada in its *Diabetes in Canada* (1999) reported that:

- There are 800,000 people over the age of 12 diagnosed with diabetes in Canada and that survey data indicates that 1.2 to 1.4 million people actually have diabetes;
- Rates of diabetes in Aboriginal peoples in Canada are highest in Saskatchewan, Manitoba and Ontario;
- Diabetes is the seventh leading cause of death. Life expectancy is reduced for people with diabetes – a total of 25,000 potential years of life lost annually to premature death;
- The actual numbers of deaths from diabetes are believed to be five times the current figures. Diabetes is often the underlying cause of heart disease, stroke, kidney disease, blindness, and lower limb amputations;
- Costs of diabetes (health care, disability, work loss, premature death) in Canada are calculated to be $9 billion annually;
- 26 percent of adults in Canada were discovered to be at risk of health problems including diabetes, because of excessive weight in 1998. In 1997 other studies reported about 50 percent of Canadian adults are above healthy body weights.

Saskatchewan Facts

- 38,124 people were diagnosed and living with diabetes in the province in 1996.
- 3,200 new people are diagnosed with diabetes each year, with a net increase of about 1,500 affected people, taking mortality and emigration into account.
- Experts believe there are many more people with undiagnosed diabetes.
- By 2010, it is projected that there will be approximately 59,000 persons diagnosed with diabetes.
- Adults of 60-79 years were 14 percent of the total population, but make up 45 percent of the people identified as having diabetes in 1996.
- 13.1 percent of non-Aboriginal peoples and 33.5 percent of Aboriginal peoples over 65 years of age have diabetes.
- 59 percent of people aged 35-64 years with diabetes are overweight.
- Saskatchewan adults have the lowest rate of physical activity of any province or territory in Canada. In 1995 only 37 percent of adults were active enough to be considered healthy.

Aboriginal peoples

- The age and sex adjusted prevalence rate of diabetes for Aboriginal peoples is three times the rate of the rest of the population.
- The average age at diagnosis of diabetes for an Aboriginal person is 48.7 years compared to an average age of 61.4 years for the rest of the population.
- 58.7 percent of First Nations people diagnosed with diabetes are women.
- Diabetes topped the list of serious community health problems identified by a subset of Saskatchewan respondents to the First Nations and Inuit Regional Health Survey.

Health Complications

- Diabetes was the number one cause of endstage renal disease in Canada in 1996.
- The percentage of people on dialysis with diabetes is increasing - 22 percent in 1988, 29 percent in 1997.
- There is six times the risk of heart disease or stroke for people with diabetes aged 35 – 64 years and four times the risk of high blood pressure compared to the general population.
- Lower limb amputations are 11 times higher in persons with diabetes.
- Diabetes is the leading cause of blindness in North America.

Selected Costs in Saskatchewan – Current and Future

- The estimated cost for selected, direct health services in 1996 was $147 million for all services provided to persons with diabetes. These costs include those not directly related to diabetes.
- Future annual costs are projected to increase over 50 percent to an estimated $227 million by 2010. (A Manitoba study indicates that from 1995 to 2010 the projected increase in direct costs for persons with diabetes will increase by 66 percent, so the estimates for Saskatchewan may be conservative.)
- Using published economic evaluations it is estimated that it costs over $55,000 per year for one person on hemodialysis in hospital and over $30,000 per year per person for peritoneal dialysis in the home. About two-thirds of the people on dialysis require hemodialysis.

Key Recommendations

The Advisory Committee has developed a number of recommendations for consideration. These are detailed in the 'Recommendations' section of this report, however some key general areas are:

Prevention

- Provide public education about prevention strategies that can delay or prevent the onset of Type 2 diabetes.
- Focus on physical activity, healthy body weight, and nutritious diet and on youth to establish positive lifestyle habits.

Education

- Ensure people with diabetes have timely access to quality diabetes education services.
- Provide information to health professionals, health districts, diabetes associations and others.
- Establish and enhance links with educational institutions to facilitate accurate, complete and practical curricula in health care programs.

Treatment

- Ensure optimal services are available and affordable to all people with diabetes.
- Ensure early detection and access to support services.

Care

- Provide a comprehensive, coordinated approach to diabetes education, care and treatment through the creation of a provincial diabetes coordinating body.
- Ensure timely access to the service(s) provided by endocrinologists, diabetes educators podiatrists, ophthalmologists, and nephrologists.

Research

- Increase understanding of diabetes and develop indicators and benchmarks for prevention, education and support.
- Improve the design and delivery of effective primary prevention programs.
- Conduct ongoing surveillance and studies of diabetes, its risk factors and associated conditions, clinical data and Aboriginal issues.

Aboriginal Issues

- Facilitate availability and access to culturally appropriate, sensitive client-centred education, care and support services for all Aboriginal peoples.
- Develop a culturally sensitive, community-based, wholistic model of prevention strategies to reduce the incidence and to prevent the complications of diabetes.
- Promote strategies for early diagnosis of Aboriginal peoples.

This report fulfils the mandate of the committee given by Saskatchewan Health in 1997. The Saskatchewan Advisory Committee on Diabetes believes that the implementation of this report will prevent many people from becoming diabetic and will enhance the lives of those who develop the disease.

RECOMMENDATIONS OF THE SASKATCHEWAN ADVISORY COMMITTEE ON DIABETES

- *The Burden of Illness – An Epidemiological Account*
- *Primary Prevention of Type 2 Diabetes*
- *Education, Care and Treatment*
- *Aboriginal Issues*

RECOMMENDATIONS
OF THE
SASKATCHEWAN ADVISORY COMMITTEE ON DIABETES

The Saskatchewan Advisory Committee on Diabetes recommends the following goals, objectives and actions to Saskatchewan Health to guide strategies to reduce through prevention, the incidence and prevalence of diabetes and its complications; and for the surveillance, education, care and treatment of persons with the disease.

The Committee believes these strategies will promote and provide for optimal health for all people with diabetes, or at risk of developing diabetes, including Aboriginal peoples, in Saskatchewan.

The Committee recognizes that these Recommendations are inter-related and will only be achieved through collaboration at many levels.

The reader may note that the styles of the recommendations are somewhat different due to the differences in the working group processes. The diversity was maintained in order to preserve the integrity of the work.

1. The Burden of Illness – An Epidemiological Account

GOAL 1

Be able to conduct ongoing, comprehensive surveillance of diabetes in Saskatchewan.

Objective 1.1

Develop and implement systems for ongoing, comprehensive surveillance of diabetes, its risk factors and associated conditions to support planning, delivery and evaluation of intervention programming for diabetes and other chronic conditions in general.

Action 1.1.1

Facilitate through the proposed province-wide coordinating body, the standardized collection of clinical data on persons with diabetes seen by diabetes educators.

Action 1.1.2

Consult with First Nations and the Federal Government (Medical Services Branch of Health Canada) to develop surveillance systems, which also identify First Nations issues in diabetes control.

Action 1.1.3

Examine with the Metis Nation the importance of ongoing monitoring and surveillance of diabetes in that population.

Action 1.1.4

Support the dissemination of diabetes surveillance reports to health professionals, researchers, health districts, diabetes associations, and other users.

GOAL 2

Enhance the capacity to do research on diabetes in Saskatchewan.

Objective 2.1

Develop the capacity to initiate meaningful studies to further improve understanding of diabetes and other related chronic conditions as well as their social and economic impact on individuals and the province as a whole.

Action 2.1.1

Develop indicators and benchmarks for prevention, care and support to allow evaluation of intervention programs, to improve efficacy through evidence-based decisions and to guide future health care delivery.

Objective 2.2

Enhance the capacity to initiate research to improve the understanding of diabetes in Aboriginal peoples.

2. Primary Prevention of Type 2 Diabetes

GOAL 1

The primary goal is to reduce the rate at which Saskatchewan people develop Type 2 diabetes and to delay the onset for others in spite of the expectation of a significant increase in incidence rates for diabetes.

Objective 1.1

Reduce age-adjusted incidence of Type 2 diabetes to 2.8 per 1000 people (a 10 percent reduction) by 2010.

GOAL 2

Saskatchewan residents will engage in health-enhancing levels of physical activity. The needs of children are considered to be particularly urgent.

Objective 2.1

Increase to at least 85 percent the proportion of children and adolescents aged 6 to 17 who are physically active (according to *Canada's Physical Activity Guide*) by 2010.

Objective 2.2

Increase to 99 percent the proportion of primary schools that implement the requirement of 150 minutes of physical education (primarily actual physical activity) per week by 2003.

Objective 2.3

Increase to at least 50 percent the proportion of people aged 18 and older who are physically active by 2010.

GOAL 3

The proportion of Saskatchewan residents who have a healthy body weight will increase significantly.

Objective 3.1

Increase the proportion of Saskatchewan people with a healthy body weight, by 2010, to the following:

- 85 percent for adolescents aged 12-17;
- 55 percent for men and 62 percent for women aged 18-34;
- 35 percent for men and 50 percent for women aged 35-64;
- 38 percent for men and 38 percent for women aged 65-74.

Objective 3.2

At least 50 percent of overweight people aged 12 and older will have adopted regular physical activity and sound dietary practices to attain a healthy body weight or to avoid further weight gain by 2010.

GOAL 4

The proportion of Saskatchewan residents who eat a nutritious diet will increase significantly.

Objective 4.1

At least 45 percent of people aged 12 and older will have dietary fat intakes at or below 30 percent of energy (total calories) by 2010.

Objective 4.2

At least 60 percent of Saskatchewan residents will eat five or more servings of vegetables and fruit and five or more servings of grain products daily by 2010.

GOAL 5

Saskatchewan Health will initiate or facilitate primary prevention programs and promote research to reduce the incidence of Type 2 diabetes.

Objective 5.1

Saskatchewan Health, with other government and non-government partners, will develop and begin to implement a program to reduce the incidence of Type 2 diabetes by 2000. This program will include:

- Funding demonstration sites in selected health districts to reduce the risk factors for Type 2 diabetes using a population health approach;
- In cooperation with partners, developing and implementing a plan to communicate with those who can effect change about best practices in primary prevention of diabetes;
- Supporting initiatives to share information from the demonstration sites and other sources with health and other professionals and leaders who work directly with citizens about how the risk of developing Type 2 diabetes can be reduced.

Objective 5.2

Saskatchewan Health will inform, by 2000, the research divisions of Health Canada that more research in the following areas would be beneficial for development and implementation of diabetes prevention programs:

- What types of environments promote obesity and how they can be altered;
- Successful intervention strategies for reducing risks among those living in poverty or with differing cultural practices;
- Dietary guidance for primary prevention of Type 2 diabetes in Canada.

3. Education, Care and Treatment

GOAL 1

Ensure that adequate funds and appropriate resources are committed for the effective implementation of the recommendations of the Saskatchewan Advisory Committee on Diabetes in the short, medium and long term.

GOAL 2

Collaborate with the federal government to acquire adequate funding for an optimal system of health service delivery for diabetes.

On February 16, 1999 the federal government announced that it would commit $55 million to confront the issue of diabetes in Canada over the next three years in the Canadian Diabetes Strategy (CDS). On November 19, 1999 the federal government announced that this amount would be increased to $115 million over five years.

Objective 2.1

Attempt to secure directly or indirectly through support to other groups at least three percent of the funds the federal government has designated for non-Aboriginal diabetes prevention and health promotion, to implement the recommendations of the Saskatchewan Advisory Committee on Diabetes.

Objective 2.2

Support Aboriginal peoples in the province in securing at least 10 percent of the monies designated for Aboriginal health and diabetes in the Aboriginal Diabetes Initiative of the CDS.

GOAL 3

Provide a comprehensive coordinated approach to diabetes education, care and treatment through the creation of a provincial diabetes coordinating body.

Objective 3.1

Establish a provincial diabetes coordinating body, funded by Saskatchewan Health and accountable to the Minister of Health that has a governing board and full time staff by 2000.

The major functions of the provincial diabetes coordinating body will be:

- Serving as a resource to diabetes educators and other health care professionals;
- Supporting and monitoring the implementation of existing standards and guidelines related to education, care and treatment of diabetes;
- Facilitating health professional continuing education and liaison with professional colleges and schools;
- Establishing a system for data collection in cooperation with the diabetes education programs;
- Monitoring access to and use of diabetes education programs;
- Ensuring culturally appropriate programming and access to programs;

- Recommending appropriate staffing and other resource needs;
- Supporting program evaluation by assisting in tracking outcomes from diabetes education programs;
- Facilitating research;
- Enhancing the use of technology in diabetes education, care and treatment, for example, telehealth; and
- Establishing criteria and responsibility for key physicians and options for remuneration.

The provincial diabetes coordinating body will exchange information and work in a cooperative manner with:

- The diabetes education programs in the health districts;
- Aboriginal organizations;
- Provincial government branches within Saskatchewan Health;
- Non-governmental organizations.

In order to carry out these functions, the provincial diabetes coordinating body will require:

1. Dedicated staff and an operating budget. The following staff members are recommended:
   - Diabetes Nurse Educator;
   - Dietitian;
   - Aboriginal Health Educator;
   - Endocrinologist;
   - Clerical support;
   - Statistician (may be a joint appointment with Provincial Epidemiologist's Office).

2. A governing board that is a representative mix of stakeholders similar to the make-up of the Saskatchewan Advisory Committee on Diabetes.

GOAL 4

Ensure every person with diabetes in Saskatchewan has timely access to quality diabetes education services as required.

Objective 4.1

Ensure each Health District has a diabetes education program staffed with both a dietitian(s) and diabetes nurse educator(s) by 2002.

Objective 4.2

Ensure an adequate ratio of diabetes education staff to people with diabetes by 2002.

Manitoba's recommended standard for the ratio of diabetes education staff to people with diabetes is: 1 FTE: 800 in urban centres; 1 FTE: 600 in rural communities and 1 FTE: 300 in northern areas (Manitoba Health, 1998).

Objective 4.3

Create an "open" referral policy to diabetes education programs and diabetes counselling in all health districts where such a policy does not already exist by 2001.

Objective 4.4

Implement the current *Standards for Diabetes Education in Canada* in all diabetes education programs in Saskatchewan with support from the provincial diabetes coordinating body by 2004.

GOAL 5

All people with diabetes in Saskatchewan have access to specialized services needed in the diagnosis and management of diabetes related complications and associated conditions.

Objective 5.1

Ensure eight adult and two pediatric endocrinologists are practicing in Saskatchewan by 2004.

Action 5.1.1

Form a task force, which includes Saskatchewan Health, the College of Medicine, University of Saskatchewan, health districts, representatives of practicing endocrinologists, family physicians and other stakeholders. Their purpose will be to design, implement and evaluate a recruitment and retention strategy, including remuneration options.

Objective 5.2

Establish as the collective mandate of endocrinologists in Saskatchewan to:

- Provide a consultation practice in endocrinology, prominently in diabetes;
- Play an educational role involving the general public, people with diabetes, colleagues in practice, medical residents, undergraduates in medicine, diabetes educators and other health care professionals;
- Play an organizational and support role to health district diabetes education programs including interactions with those key physicians who are the local resources; (see Goal 8)
- Be involved in research, particularly for those with a university affiliation.

Objective 5.3

Ensure timely access to quality foot care and prevention services for people with diabetes by specifically trained health professionals, including chiropodists and podiatrists by 2001.

Objective 5.4

Provide personnel resources through the Canadian Diabetes Association to North and South Diabetes Educator Sections, to develop a template for policies and procedures for expanding the role of diabetes nurse educators for medication adjustment in accordance with the SRNA scope of practice guidelines by 2000.

GOAL 6

Ensure early detection of diabetes and initiate appropriate follow-up care.

Objective 6.1

Promote appropriate and accurate screening for diabetes for all residents of Saskatchewan through the implementation of the *Clinical Practice Guidelines* (CPG) recommendations for screening and diagnosis of diabetes. The provincial diabetes coordinating body will monitor the implementation and use of the CPG on an ongoing basis.

GOAL 7

Individuals with diabetes, their families and support networks will have the necessary supports to achieve self-care practices to the best of their ability.

Objective 7.1

Provide initial and ongoing education and follow-up for people with diabetes and their families via diabetes education programs and family physicians by 2004.

Objective 7.2

Provide information about community-based support services including the Canadian Diabetes Association, as part of diabetes education programming and through family physicians' offices by 2004.

GOAL 8

Ensure practicing health professionals who interact with people with diabetes are knowledgeable regarding diabetes and its management and implement the *Clinical Practice Guidelines* in their professional practice.

Objective 8.1

Establish, through the provincial diabetes coordinating body, a provincial network of at least one key physician per service area who will become a diabetes resource for that area by 2001.

These key physicians will provide support to both the diabetes educators in the local diabetes education program and other health district physicians. The provincial coordinating body will establish criteria and responsibilities for key physicians and options for remuneration.

Objective 8.2

Establish a process for designated key physicians to attend an annual continuing education meeting and be part of provincial discussions regarding diabetes care and treatment by 2001.

The provincial diabetes coordinating body in partnership with Continuing Medical Education, industry and endocrinologists will coordinate the above.

Objective 8.3

Ensure collaboration between the provincial diabetes coordinating body and the continuing education bodies of relevant health professions, e.g., nurses, pharmacists, dietitians, diabetes educators, practicing physicians, etc., to provide regular high quality and accessible continuing education.

GOAL 9

Ensure accurate, current and practical curricula for students in the health sciences who will provide direct care for people with diabetes.

Objective 9.1

Establish, through the provincial diabetes coordinating body, links with health professional and related Universities, Colleges and Schools to offer assistance to programs in reviewing their diabetes-related curricula.

GOAL 10

Reduce the impact of the human and financial costs of diabetes complications for people with diabetes so that they can afford optimal diabetes care.

Objective 10.1

Include insulin syringes and pen needles on the Saskatchewan Prescription Drug Plan Formulary by 2001.

Objective 10.2

Cover the cost of all diabetes supplies (including blood glucose meters and syringes), not subsidized through government or private plans, for all individuals with diabetes where the combined annual income for a family of four is $28,000 or less.

Objective 10.3

Review with the Department of Social Services the funding system for coverage of therapeutic diets. It is recommended that additional funding be provided for all diabetic diets, regardless of energy level.

4. Aboriginal Issues

GOAL 1

Culturally appropriate, client-centered diabetes education, care and support services will be available to all Aboriginal peoples in Saskatchewan.

Action 1.1

Develop mechanisms that encourage collaboration among local diabetes health teams, physicians and other health care providers to ensure the provision of high quality diabetes services to Aboriginal peoples.

Action 1.2

Ensure accessibility to a diabetes health team (dietitian and diabetes nurse educator) within their community or as close to their community as possible.

Action 1.3

The proposed provincial diabetes coordinating body, in partnership with Aboriginal communities and organizations, will develop a process to identify the gaps in services faced by Aboriginal peoples affected by diabetes.

Action 1.4

The proposed provincial diabetes coordinating body will initiate discussions with Saskatchewan Health, Health Canada, Tribal Councils, representatives of the Metis Nation, independent First Nations and health districts to ensure appropriate funding and resources for services to Aboriginal peoples affected by diabetes regardless of place of residence.

Action 1.5

Ensure that the proposed provincial diabetes coordinating body has qualified staff designated to work in Aboriginal diabetes. This should assure that providers of diabetes education have current knowledge, as well as skills, and are aware of the cultural and social issues affecting Aboriginal peoples with diabetes.

Action 1.6

Saskatchewan health districts and Aboriginal health organizations need to work in partnership with local community health care providers to improve accessibility to comprehensive diabetes services (education, care, treatment and support) so that people affected by diabetes can achieve and maintain optimal diabetes control.

GOAL 2

Effective, wholistic*, community-based prevention strategies be developed to reduce the incidence of diabetes among Aboriginal peoples in Saskatchewan and to prevent the complications of diabetes.

Action 2.1

Saskatchewan Health and health districts work with Aboriginal communities and agencies throughout the province to ensure that:

- The goals and objectives addressing prevention in this document incorporate traditional Aboriginal approaches;
- The strategies are culturally appropriate and adaptable to meet the needs of all Aboriginal peoples regardless of their place of residence; and
- These strategies be throughout the provincial health care system and are flexible to incorporate Aboriginal approaches which may be different in different parts of the province.

Action 2.2

The program activities and approaches of Saskatchewan Health, health districts and the proposed Saskatchewan diabetes coordinating body should support Aboriginal school and community initiatives, which promote healthy lifestyles including traditional practices that encourage active living, healthy eating and smoking cessation.

Action 2.3

Work to ensure that northern and remote communities have equitable access to quality, low cost foods (including traditional food sources) to address food security issues. This could be done in partnership with other provincial and federal government departments (i.e. Agriculture and Food, Transport Canada, Liquor and Gaming Authority, Canada Post, Social Services, etc.).

Action 2.4

Support Aboriginal media organizations to develop mass media products which focus on positive lifestyle and healthy eating using appropriate language with translation when required.

GOAL 3

Aboriginal peoples with diabetes will be diagnosed at the earliest stage possible.

Action 3.1

Explore all opportunities for screening of Aboriginal peoples. Aboriginal Health Authorities and health districts will implement the 1998 *Clinical Practice Guidelines* for the management of diabetes in Canada and in particular ensure that the guidelines for screening Aboriginal adults are followed.

*wholistic *In Aboriginal societies there was no word, term or expression for "health" as it is understood in Western society (Brady et al, 1997). The term wholistic embraces a "whole of life" view including physical, mental, emotional and spiritual realms, therefore the Working Group prefers to use "wholistic" rather than "holistic".*

THE BURDEN OF ILLNESS - AN EPIDEMIOLOGICAL ACCOUNT

- *Introduction*
- *Data Analyses Performed*
- *Geographic Distribution of Diabetes in Saskatchewan in 1996*
- *Highlights of the Findings*
- *Impact*
- *Limitations*
- *Recommendations*

THE BURDEN OF ILLNESS
AN EPIDEMIOLOGICAL ACCOUNT

Introduction

What is diabetes?

Diabetes (diabetes mellitus) is a chronic condition characterized by hyperglycemia (high blood sugar) due to a deficiency of insulin which is produced in the pancreas, a decreased ability of the body to use insulin, or both. Insulin is essential to convert glucose (sugar) into energy and for the metabolism of fats, carbohydrates and proteins.

Traditionally diabetes is divided into two types:

Type 1 diabetes is most often due to an autoimmune destruction of the insulin producing cells in the pancreas. Once established in the individual that person will have to take daily insulin injections. It usually occurs before the age of 30, but can occasionally occur at an older age;

Type 2 diabetes, the most common type, usually appears after age 40, but can occur at a younger age, especially in high risk populations. It tends to be associated with obesity and it is not an autoimmune reaction.

Although there is no cure for diabetes the disease can be well controlled. Over time uncontrolled hyperglycemia can lead to severe damage to blood vessels and nerves. As a result, people with diabetes are at high risk for heart attacks, strokes, kidney failure, blindness, and gangrene of the lower limbs leading to amputation, as well as malfunction of many organs and systems. The human and economic costs of these complications are staggering. The prevention and treatment of diabetes will be most effective and efficient as an integral part of comprehensive health care services.

Magnitude of the problem

Diabetes is a major health issue in Saskatchewan. It is among the top ten leading causes of hospitalization and death in that province. Together with its complications and co-morbidities (commonly associated diseases and conditions), diabetes represents a significant burden to individuals and to the health system, both in terms of costs and utilization of health services.

A recent Manitoba study of diabetes and its costs found that from 1995 to 2010 there is projected to be a doubling of the prevalence of diabetes in that province. There will also be a doubling of the annual numbers of lower limb amputations and numbers of cases of dialysis in persons with diabetes. The number of hospitalizations for persons with diabetes who have cardiovascular disease will increase by 70 percent.

Trends

Diabetes is increasingly being recognized as a problem as more investigations are being done. The World Health Organization (WHO) reported in 1994 that there were 100 million people diagnosed with diabetes in the world and estimated by the year 2010 the number of people with diabetes will exceed 230 million (WHO, 1994; de Courten et al., 1998).

The epidemiological information in this section of the report includes:

- A brief review of the database development, incidence, and prevalence trend estimates by gender, age-group and First Nations ancestry;
- A summary map of the 1996 estimated prevalence rates of diabetes in health districts;
- A cost estimate of diabetes in Saskatchewan; and
- Recommendations.

Data Analyses Performed

This section is based on analyses of information contained in Saskatchewan's health databases. The population from which individuals with diabetes were identified consists of all residents in the province that were eligible for Saskatchewan Health coverage at any point during the years 1991 to 1996. With the exception of people whose health care is federally funded (i.e., members of the Royal Canadian Mounted Police or Canadian Forces and inmates of federal penitentiaries), all provincial residents are eligible for Saskatchewan Health coverage. Those excluded from coverage account for about one percent of the total population.

All Saskatchewan Health beneficiaries who had one or more outpatient prescription for insulin or an oral anti-diabetic agent, two or more physician visits with a diagnosis of diabetes within a two year period, and/or one or more hospitalization for diabetes during the period January 1, 1991 to December 31, 1996 were identified. Outpatient prescription information for First Nations* peoples is not available in the Saskatchewan databases because the federal government covers their prescriptions. Therefore, for the purposes of this section of the report, the definition of diabetes in the First Nations population is two or more physician visits for diabetes within a two-year period and/or one or more hospitalization for diabetes during the period January 1, 1991 to December 31, 1996.

Subjects were considered 'incident', or newly diagnosed, in a given year if they did not previously meet the above inclusion criteria during the period beginning January 1, 1989. People with diabetes were considered to be prevalent cases in a given year if they had been identified between 1991 and the year in question, inclusive, and were eligible for Saskatchewan Health coverage at any time during that year. Incidence and prevalence estimates in health districts and for First Nations peoples were age-sex adjusted using the direct method of standardization. The 1996 covered Saskatchewan population was used as the standard.

**The term First Nations is used in the context of this report to describe those identified as registered Indian in the Saskatchewan Health information system. The term Aboriginal is used to be more inclusive of First Nations and Metis peoples.*

Epidemiological information is useful in planning both disease management activities and prevention strategies. From a disease management perspective, epidemiological studies can be used to provide such information as the number of people with diabetes in a population and the demographics of the population with diabetes. From a prevention perspective, epidemiological studies are helpful in identifying subgroups of the population at greatest risk for developing diabetes such that prevention strategies may be appropriately targeted.

In the findings section of this report, we will first describe the population with diabetes and then use the data to identify subgroups of the population at greatest risk of developing diabetes. The economic impact of diabetes will then be briefly addressed.

Findings

A total of 45,716 individuals were identified as having diabetes in Saskatchewan during the years 1991 to 1996 (Table 1). Because of emigration and/or death we estimate that there were 38,124 individuals diagnosed with diabetes living in the province in 1996 out of a total health insurance covered population of 1,027,551. Of the 45,716 identified, 4,061 (8.9 percent) were First Nations and 41,655 (91.1 percent) were members of the rest of the population (Table 1 and Figure 1). Because information about drug use was not available for First Nations peoples, the observed number of people with diabetes in this population is likely underestimated relative to the rest of the population. To assess the degree of underestimation, the definition of diabetes in the general population was modified to include the same criteria as in the First Nations population (i.e., inclusion based only on hospitalization and physician services data). Using the modified inclusion criteria, the number of individuals identified as having diabetes would fall by 8 percent. Thus, the number of cases in the First Nations population is likely to be even higher than 4,061 (i.e. 4,386).

[The data available on First Nations people recognize those identified as registered Indian in the Saskatchewan Health information system. The information system has the capacity to identify specific information on registered Indian people, but not other Aboriginal peoples such as Metis.]

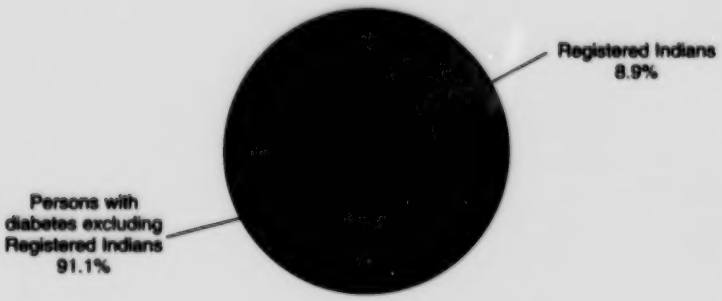
Table 1: Persons with Diabetes in Saskatchewan

Persons with diabetes	First Nations (n = 4,061)	Number Excluding first Nations (n = 41,655)	Total Number (n = 45,716)
Gender			
male	1,677 (41.3%)	22,131 (53.1%)	23,808 (52.1%)
female	2,384 (58.7%)	19,524 (46.9%)	21,908 (47.9%)
Average Age	48.7	61.4	60.3
Age Distribution			
0-39 years	1,116 (27.5%)	4,936 (11.8%)	6,052 (13.2%)
40-64 years	2,296 (56.5%)	15,990 (38.4%)	18,286 (40.0%)
65+ years	649 (16.0%)	20,729 (49.8%)	21,378 (46.8%)

‡ Age is calculated as of the first diabetes-related hospitalization, physician service or outpatient prescription during the period January 1, 1991 to December 31, 1996.

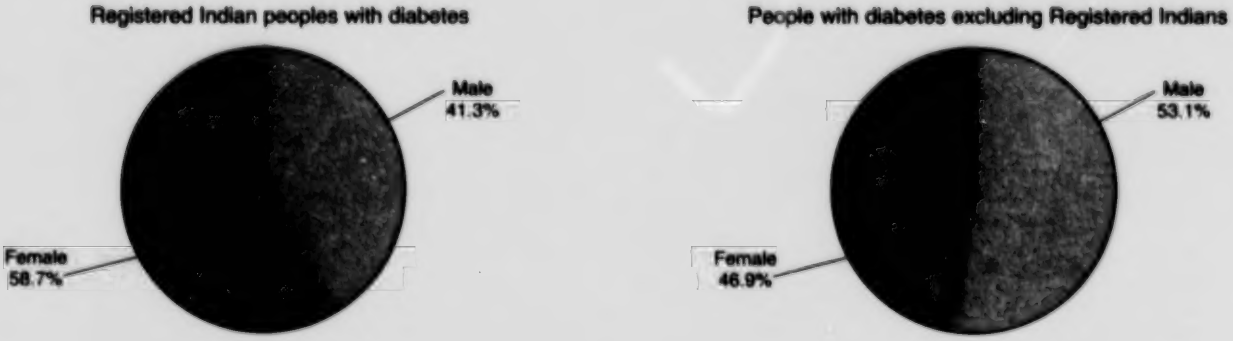
A slight majority of people with diabetes are male (Table 1).

Figure 1: Percentage of all people with Diabetes by First Nations Status



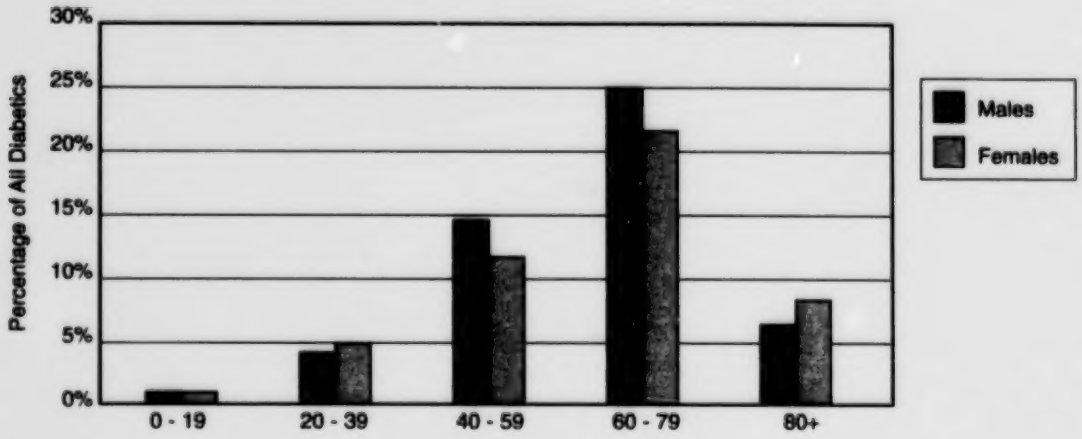
When the population with diabetes was subdivided into First Nations versus the rest of the population, differences in the gender split became apparent. In the First Nations population, the majority (58.7 percent) of identified people with diabetes were women (Figure 2). In the rest of the population, however, a slight majority of people with diabetes were male (Figure 2).

Figure 2: Proportion of People with Diabetes by Gender in Registered Indian Population (First Nations) and population excluding Registered Indians.



Diabetes is typically a disease of older persons. Whereas adults aged 60 to 79 years represent about 14 percent of the total Saskatchewan population, this group accounted for more than 45 percent of identified people with diabetes in 1996 (Figure 3). Interestingly, First Nations peoples with diabetes tend to be younger than other people with diabetes. In this population, adults aged 40 to 59 accounted for the greatest proportion of diabetes (48 percent). The tendency toward a younger First Nations population with diabetes was also evidenced in both the average age of persons with diabetes (48.7 years vs. 61.4 years in the rest of the population) and the percentage of people with diabetes less than 40 years of age (27.5 percent vs. 11.8 percent in the rest of the population) (Table 1).

Figure 3: Percentage of all People with Diabetes in 1996 by Age Group



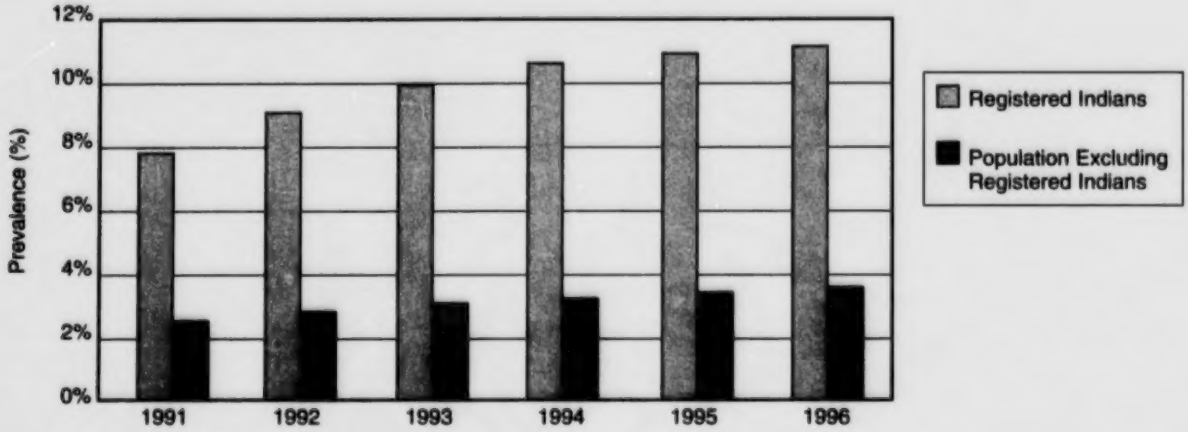
In 1996, 3,224 Saskatchewan residents were newly diagnosed with diabetes. Of these, 271 were from the First Nations population and 2,953 were from the rest of the population. This corresponds to incidence rates of 0.31 percent in the total population.

There were over 38,000 persons with diagnosed diabetes living in Saskatchewan in 1996. This includes people newly diagnosed in 1996 as well as those identified between 1991 and 1995 who still had coverage in 1996. This translates to an overall prevalence rate of 3.7 percent of a 1996 health insurance covered population of 1,027,551. The prevalence of diabetes was higher in the First Nations population than in the rest of the population: 4.5 percent (3,680) versus 3.6 percent (34,444).

In the population excluding First Nations, the prevalence of diabetes increased slightly throughout the study period (Figure 4). From 1994 to 1996, the years for which prevalence estimates are most precise, prevalence rose by 10 percent from 31,410 to 34,444 people with diabetes. The somewhat lower prevalence figures in the first few years of the study are likely a reflection of the study identification process (Figure 4). For example, in 1991 subjects had only one year to meet the study criteria. By 1996, however, subjects had six years in which to meet the study criteria. Among First Nations, the prevalence also appeared to increase, even after excluding 1991 to 1993 where the prevalence was underestimated to a greater degree. From 1994 to 1996, prevalence in this population rose by 14 percent from 3,231 to 3,680.

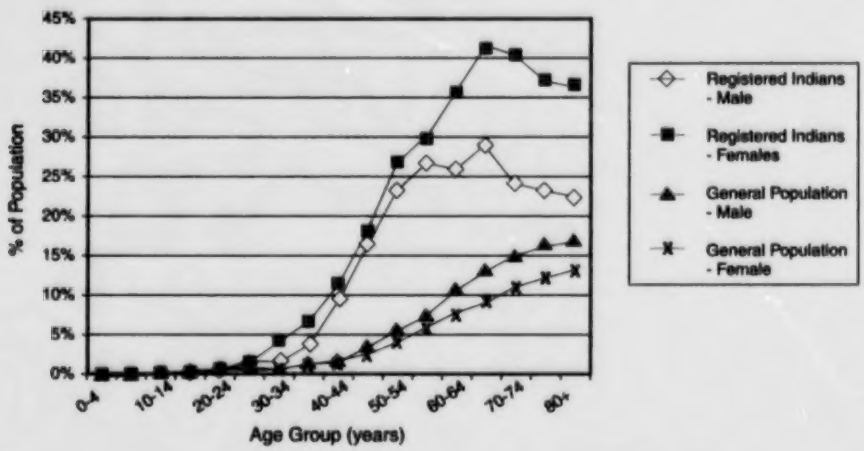
Analyses relating to the risk of diabetes in population subgroups show that the First Nations population is at a much greater risk of developing diabetes than the rest of the population. Other studies in Northern Saskatchewan suggest that Metis people also have similar risks (Aboriginal Issues section of this report). When the incidence rates were age-sex adjusted to account for differing population structures, the incidence rate in the First Nations population (0.66 percent) was more than double that in the rest of the population (0.31 percent). The age-sex adjusted prevalence rate was approximately three times higher for First Nations (11.1 percent) than for the general population (3.5 percent). For individuals 20 years of age and older, the prevalence rate among First Nations exceeded that in the general population for both males and females.

Figure 4: Prevalence of Diabetes in Saskatchewan, 1991 – 1996



The data also show that the likelihood of having diabetes is higher among older person than their younger counterparts. In the population excluding First Nations, prevalence increases with age (Figure 5). In this population, 13.1 percent of individuals aged 65 and over were identified as having diabetes. Among First Nations, prevalence also increases with age up to the 65-69 year age group and then begins decreasing somewhat. In this population, 33.5 percent of individuals aged 65 and over were identified as having diabetes.

Figure 5: Prevalence of Diabetes in Saskatchewan in 1996 by Age, Gender and First Nations Status



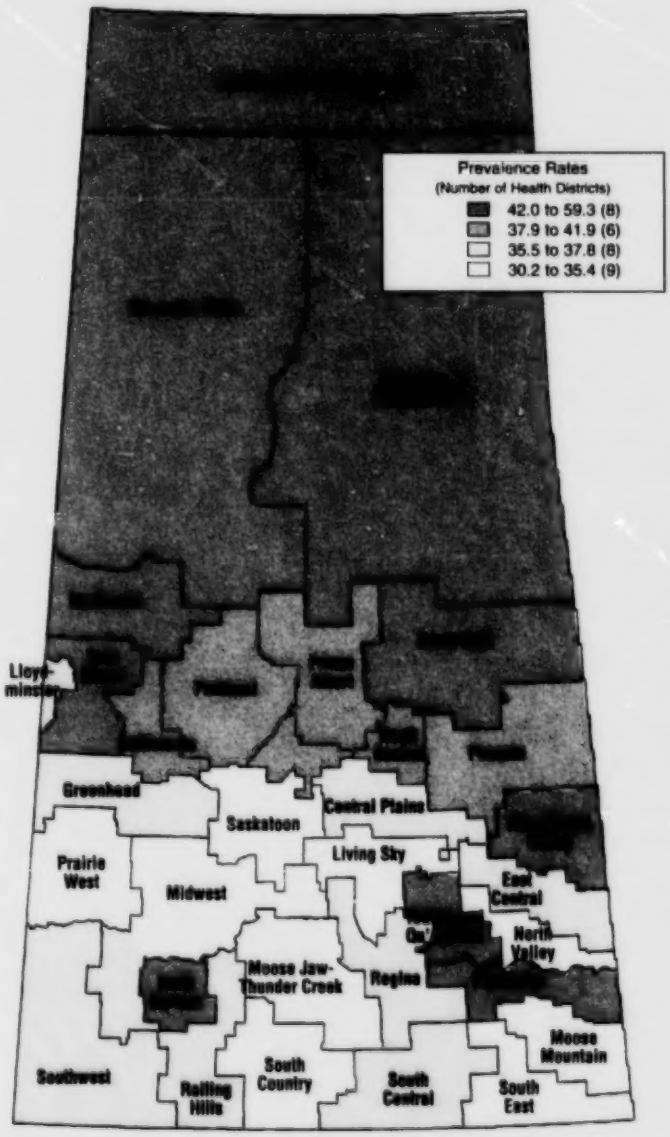
Gender also influences the likelihood of developing diabetes. In the First Nations population, women are more likely to develop diabetes than men are (5.3 percent and 3.7 percent prevalence rates, respectively). In the rest of the population, men are more likely to develop diabetes than women are (3.9 percent and 3.4 percent respectively). The gender differences are greatest in older people (Figure 5). Particularly striking are the high rates of diabetes among First Nations women (Figure 5).

Geographic Distribution of Diabetes in Saskatchewan in 1996

Analyses of the geographic distribution of age-sex adjusted diabetes prevalence rates showed wide regional variation (Figure 6). These analyses were conducted using rates per 1,000 population, rather than expressing rates as a percentage of the population. As indicated above, the prevalence rate for diabetes in Saskatchewan in 1996 was 3.7 percent, or 37.1 cases per 1,000 population.

Age-sex patterns of diabetes in the health districts were generally the same as in the province. The provincial age-specific prevalence rates for males were higher than the female rates for all age groups after 40 years. This general pattern of male prevalence rates exceeding female rates held true for most age groups over 40 years in most health districts, although the differences were less pronounced in some health districts. Notably, the effect of gender was reversed in Northern Saskatchewan where age-specific rates in females exceeded those in males for all age groups. This observation is likely due to the greater proportion of First Nations population living in Northern Saskatchewan since the analyses at the provincial level indicated that diabetes is more common among female First Nations than their male counterparts.
Diabetes prevalence is age related, lowest in youth and increasing with advancing age. This pattern was common in all health districts.

Figure 6: Age-Sex Adjusted Prevalence Rates for Diabetes in Health Districts Saskatchewan, 1996 (per 1000 population)



Highlights of the Findings

The prevalence rate for diabetes in Saskatchewan in 1996 was 37.1 cases per 1,000 population. Age-sex adjusted prevalence rates in the health districts ranged from 30.2 to 59.2 cases per 1,000 population (Figure 7 and Table 2).

Figure 7: Age-Sex Adjusted Prevalence Rates for Diabetes in Health Districts in Saskatchewan, 1996

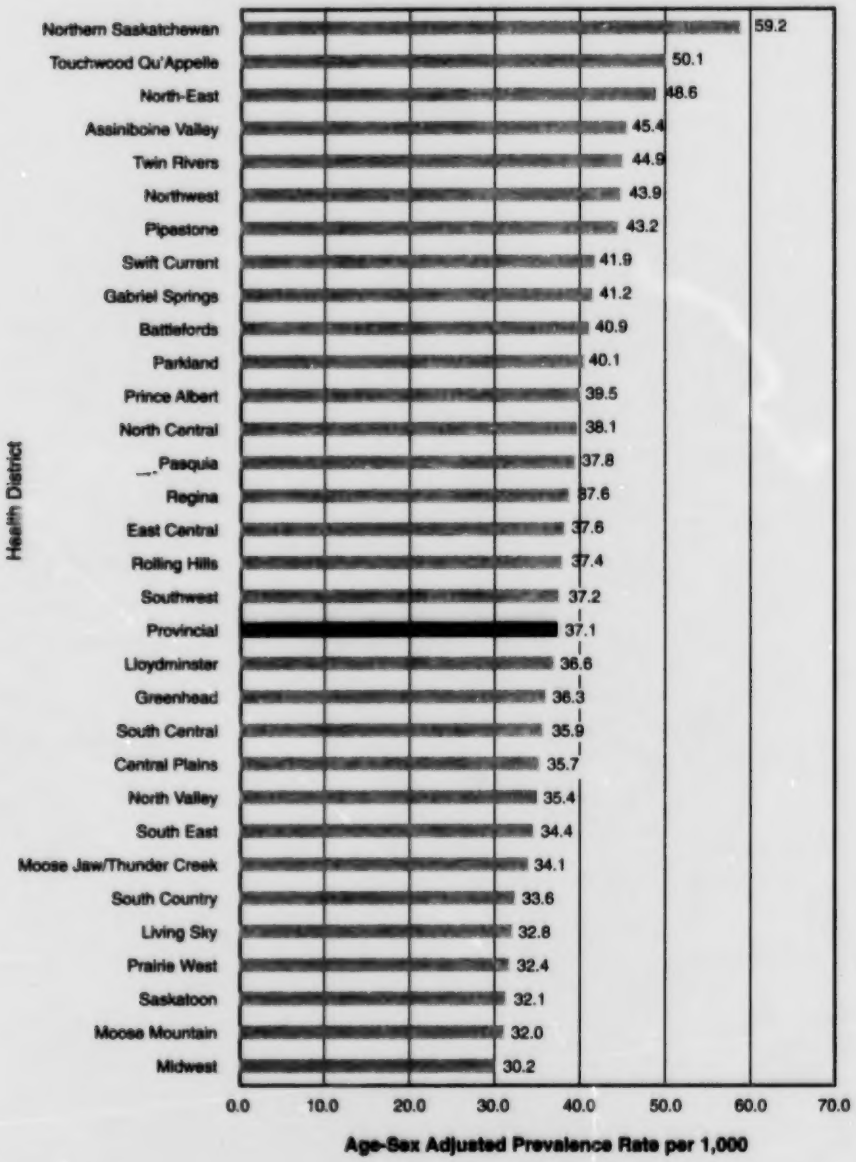


Table 2 - Prevalence of Diabetes in Saskatchewan by Health District, 1996

Health District	Number of Diabetics			Prevalence Rate per 1,000			Age-Sec Adjusted Prevalence Rate* per 1,000
	Male	Female	Total	Male	Female	Total	
Assiniboine Valley	553	536	1,089	66.2	64.5	65.3	45.4
Battlefords	544	584	1,129	39.5	41.5	40.5	40.9
Central Plains	500	449	949	46.8	42.9	44.9	35.7
East Central	732	719	1,451	48.1	45.2	46.6	37.6
Gabriel Springs	248	272	520	42.6	47.2	44.9	41.2
Greenhead	329	290	619	41.9	38.4	40.2	36.3
Living Sky	328	272	599	45.7	38.4	42.1	32.8
Lloydminster	138	126	264	24.9	23.9	24.4	36.6
Midwest	384	289	673	42.1	32.3	37.2	30.2
Moose Jaw/Thunder Creek	935	839	1,774	40.9	35.1	38.0	34.1
Moose Mountain	290	229	519	43.3	35.4	39.4	32.0
North Central	278	271	549	44.4	42.9	43.6	38.1
North Valley	357	367	724	46.9	47.3	47.1	35.4
North-East	374	449	823	46.2	56.9	51.5	48.6
Northern Saskatchewan	366	577	943	22.5	38.4	30.2	59.2
Northwest	217	277	494	29.7	39.0	34.2	43.9
Parkland	432	430	862	41.1	43.2	42.2	40.1
Pasquia	432	379	811	48.1	44.5	46.4	37.8
Pipestone	524	478	1,002	53.5	48.7	51.1	43.2
Prairie West	277	248	526	36.6	33.8	35.2	32.4
Prince Albert	1,047	1,027	2,074	37.5	36.1	36.8	39.5
Regina	3,961	3,353	7.313	37.5	30.8	34.1	37.6
Rolling Hills	267	250	517	46.6	44.1	45.4	37.4
Saskatoon	3,322	3,164	6,485	29.0	26.8	27.9	32.1
South Central	471	426	897	46.0	41.4	43.7	35.9
South Country	300	230	530	48.6	37.8	43.2	33.6
South East	485	419	904	38.2	34.3	36.3	34.4
Southwest	322	329	651	41.8	43.5	42.6	37.2
Swift Current	473	501	973	47.9	48.1	48.0	41.9
Touchwood Qu'Appelle	429	370	798	58.3	51.3	54.8	50.1
Twin Rivers	320	341	661	39.0	43.9	41.4	44.9
Provincial	**19.634**	**18.490**	**38,124**	**38.4**	**35.8**	**37.1**	**37.1**

* Prevalence rates were age-sex adjusted using the Saskatchewan Covered Population, 1996, as the standard.

Health districts with higher age-sex adjusted prevalence rates than the provincial rate clustered in the northern and north-central area of the province. This high prevalence area included Northern Saskatchewan, Northwest, Twin Rivers and North-East, forming an arch over the northern borders of Prince Albert and Parkland which have average rates (Figure 6). Three other high prevalence areas, Touchwood Qu'Appelle, Assiniboine Valley and Pipestone Health Districts clustered in the eastern part of the province (Figure 6). The two lowest diabetes prevalence areas were in the Midwest and Moose Mountain Health Districts.

There are over 3,200 new cases diagnosed per year, but about 1,700 persons with diabetes either die or leave the province per year for a net increase in the prevalence of about 1,500 per year. Thus, by the end of 1999 we can estimate that there were about 42,500 persons living with diagnosed diabetes in the province. If this trend continues, between 2000 and 2010 there will be about 16,500 more people diagnosed with diabetes. This would lead to an estimated total of 59,000 people with diabetes in Saskatchewan. It is thought that there are a considerable number of people with undiagnosed diabetes in the community.

Impact

The major complications of diabetes include heart disease, hypertension (high blood pressure), lower limb amputations, kidney disease, and eye disease. Diabetes is the leading cause of blindness in North America (Klein, 1984). It is the number one cause of endstage renal disease in Canada (CORR, 1999). One-half of all lower limb amputations in the United States occur in people with diabetes (Last, 1992). Of the 389 lower limb amputations in Saskatchewan in 1997-98 approximately 50 percent occurred in people with diabetes. The risk of cardiovascular disease is two to four times higher in people with diabetes than those without diabetes. Stroke is increased by an equal magnitude in people with diabetes (Garcia, 1974).

Diabetes and its complications represent a significant burden both to individuals and to the health system. Whereas people with diabetes represented 3.7 percent of the Saskatchewan population in 1996, they accounted for nearly 12 percent of hospitalizations.

Part of this high hospitalization rate can be attributed to the fact that people with diabetes tend to be older than the rest of the population and older people are more likely to be hospitalized. However, diabetes also has serious complications, which contribute to the higher hospitalization rates among people with diabetes.

A study in Manitoba (Manitoba Health, 1998) showed that people with diabetes accounted for 27 percent and 24 percent of all those hospitalized for heart disease and stroke, respectively, in 1991.

The cost of specific treatment and care of persons with the complications of diabetes is significant. A close look at endstage renal disease costs resulting from diabetes will be instructive. The overall

proportion of people on dialysis due to diabetic renal disease has increased from 22 percent in 1988 to 29 percent in 1997 (CORR, 1999). This percentage is likely to continue to increase since there has been a substantial increase in the proportion of new dialysis patients with diabetes. For example, in 1997, 51 of 129 new patients (40 percent) on dialysis in Saskatchewan had diabetes.

The cost of renal dialysis has been estimated in several studies. Goeree et al (1995) estimated that the direct annual treatment costs in 1991 for hospital hemodialysis was $54,929 and for continuous ambulatory peritoneal dialysis (CAPD) was $31,918 (in 1993 Canadian dollars). Fully allocated costs were $88,585 and $44,790 respectively. Coyte et al (1996) estimated fully allocated costs for paediatric dialysis at $76,023 for hospital hemodialysis and $47,569 for CAPD in 1994.

Nationally, approximately 70 percent of dialysis patients with endstage renal disease due to diabetes were on hemodialysis (CORR, 1999). Using this percentage and based on the costs, determined by Goeree et all one can estimate that the additional direct treatment cost in services for hemodialysis and CAPD for the 51 new patients entering the program in 1997 due to diabetes will be $2.45 million (in 1993 dollars).

The overall cost estimates are based on a similar study published in Manitoba in 1998 (Manitoba Health). This cost includes any selected health care encounters (i.e. hospital services, personal home care services, professional services, dialysis) whether it was related to the diabetes or not. For example, if a person with diabetes sees a physician for an unrelated illness, the cost for this would be included in this analysis. Further research will need to be done to assess costs related only to the disease of diabetes. It has been estimated by others, however, that in the United States health care costs are 2.5 times as high for diabetics compared with non-diabetics (American Diabetes Association, 1997). Saskatchewan estimates of selected health services (hospital services, personal care home services, professional services and dialysis) were obtained by comparing the number of people with diabetes estimated in Saskatchewan to the number estimated in Manitoba and projecting their impact on the selected services. Limitations to the data use are described below. We estimate that in 1996 the cost of those selected services to people with diabetes who form approximately four percent of the population, was about $147 million.

Limitations

The figures presented in this analysis, excluding the costs, were based solely on information contained in Saskatchewan's health databases. Therefore, people with diabetes who had no hospitalizations for diabetes, no outpatient prescriptions for insulin or an oral hypoglycemic agent and less than two physician visits for diabetes within a two year period during 1991-96 were not captured in this study. Given the relatively long subject inclusion period of six years, we expect that the number of people diagnosed with diabetes not identified in this study is minimal. However, individuals with undiagnosed diabetes cannot be identified from the administrative databases and were, therefore, excluded from the analysis.

Use of administrative data permitted comparisons of First Nations peoples with the general population. However, it was not possible to compare rates of diabetes for all Aboriginal peoples. First Nations population includes only those individuals with treaty status. Non-treaty Indians and Metis peoples are included in the general population figures. In addition, some First Nations may not be identified as such in the Saskatchewan Health registry. Therefore, both the number of people with diabetes and the number of people in the First Nations population may be underestimated. Although we were unable to identify Metis persons in this study, previous work conducted in Saskatchewan (Pylypchuk et al., 1998) suggests that Metis communities have a risk of diabetes that is similar to First Nations populations.

Another limitation relating to the identification of diabetes among First Nations peoples is the lack of outpatient prescription drug information for this population. In addition, there may be incomplete capture of people with diabetes in Northern Saskatchewan, many of whom are First Nations persons, because the physician services data do not include services provided by salaried physicians working in the north. Both of these factors contribute to the underestimation of the incidence and prevalence of diabetes among First Nations peoples.

Identification of diabetes was based on drug use or diagnostic codes in the physician services and hospital separation databases. Because the diagnostic coding scheme does not distinguish between Types 1 and 2 diabetes, we were unable to distinguish between these types of diabetes in our analysis. As such, all people with diabetes were considered together.

Other limitations of this study relate to the availability and specificity of physician services data. There is the potential for under-ascertainment of diabetes based on physician services information because only one diagnosis is reported per visit, regardless of the number of conditions affecting the patient. Thus, some people diagnosed with diabetes with multiple conditions may not have a diagnosis of diabetes recorded in the physician services database. Because three data sources (drug, hospital and physician services) and a relatively long study period were used for subject identification, the degree of underestimation is expected to be small.

Lastly, although most limitations relate to the under-ascertainment of individuals with diabetes, there is also the potential that some people who do not have diabetes were misclassified as having diabetes. Such misclassification may result from records in which clinical investigations to rule out diabetes were reported using the diabetes diagnostic code. To minimize such misclassification, subjects were required to have at least two physician visits within a two-year period if they did not have any diabetes-related hospitalizations or prescriptions during the study period.

As intimated above, the cost estimates of selected health services for persons with diabetes were done crudely by obtaining the proportion of people with diabetes in Saskatchewan and comparing it to the proportion in Manitoba and deriving the comparable costs.

Recommendations

GOAL 1

Be able to conduct ongoing, comprehensive surveillance of diabetes in Saskatchewan.

Objective 1.1

Develop and implement systems for ongoing, comprehensive surveillance of diabetes, its risk factors and associated conditions to support planning, delivery and evaluation of intervention programming for diabetes and other chronic conditions in general.

Action 1.1.1

Facilitate through the proposed province-wide coordinating body, the standardized collection of clinical data on persons with diabetes seen by diabetes educators.

Action 1.1.2

Consult with First Nations and the Federal Government (Medical Services Branch of Health Canada) to develop surveillance systems, which identify First Nations issues in diabetes control.

Action 1.1.3

Examine with the Metis Nation the importance of ongoing monitoring and surveillance of diabetes in that population.

Action 1.1.4

Support the dissemination of diabetes surveillance reports to health professionals, researchers, health districts, diabetes associations, and other users.

GOAL 2

Enhance the capacity to do research on diabetes in Saskatchewan.

Objective 2.1

Develop the capacity to initiate meaningful studies to further improve understanding of diabetes and other related chronic conditions as well as their social and economic impact on individuals and the province as a whole.

Action 2.1.1

Develop indicators and benchmarks for prevention, care and support to allow evaluation of intervention programs and improve efficacy through evidence-based decisions and to guide future health care delivery.

Objective 2.2

Enhance the capacity to initiate research to improve the understanding of diabetes in Aboriginal peoples.

References – see Appendix 3

PRIMARY PREVENTION OF TYPE 2 DIABETES

- *Introduction*
- *Principles for Action*
- *Priorities for Primary Prevention of Type 2 Diabetes*
- *Recommendations for Primary Prevention of Type 2 Diabetes*
- *Actions Utilizing a Population Health Approach to Accomplish Objectives*
- *Conclusion*

PRIMARY PREVENTION OF TYPE 2 DIABETES

Introduction

This section of the report will focus on the primary prevention of Type 2 diabetes because it can be prevented or delayed for many people. Little is known at this time about the opportunities for prevention of Type 1 diabetes, formerly called juvenile diabetes or insulin dependent diabetes (IDDM).

Type 2 diabetes, formerly called maturity onset diabetes or non-insulin dependent diabetes (NIDDM), has been increasing and will continue to increase at alarming rates unless immediate action is taken. By the end of 1996 there were approximately 38,124 Saskatchewan people identified as having diabetes. In the same year 3,224 new cases were found. Approximately 90 percent of people with diabetes have Type 2. There are likely to be many people who have diabetes who do not yet know they have it. The rates of diabetes will rise as screening improves; as the Aboriginal proportion of the population increases; as levels of physical inactivity and obesity continues to grow and as the population ages.

We are all at risk for developing diabetes. The majority of Saskatchewan adults have at least one major risk factor for diabetes. While we can identify some people who are at higher risk for diabetes because of their family histories, we cannot say that any individual is not at risk of developing diabetes. This is a compelling argument for taking a broad approach to reducing the risks.

If we are to stem this tide, immediate and effective action is required on many fronts to create healthier environments that support individuals, families and communities in making the necessary changes. The primary prevention of Type 2 diabetes information in this section of the report includes:

- Principles for action;
- Priorities for primary prevention;
- Recommendations for primary prevention;
- Actions utilizing a Population Health approach to accomplish objectives; and
- Suggested strategies to implement the recommendations for specific groups of people.

Principles for Action

While there is a need for programs for high-risk individuals, the need is even greater to promote environments that support good health for all residents. When the environment promotes obesity and physical inactivity, the risks increase for all individuals.

Primary prevention of Type 2 diabetes programs will be more successful if they employ a number of principles. For example, socio-economic status and social networks are crucial determinants of health

(Saskatchewan Health, 1999). Action must include individuals, families, communities, governments, the media and businesses in the development and implementation.

Principles

- Use a population health approach when developing programs. This includes recognition that socio-economic status, educational levels, working conditions and other factors may be insurmountable barriers to success unless they are addressed.
- Develop programs and policies for prevention of Type 2 diabetes that support healthful social, economic and commercial environments.
- Work with partners, including related risk reduction programs, groups outside the health field and community representatives to reduce risk factors for Type 2 diabetes.
- Include potential participants and their leaders in program design and delivery so they are better tailored to meet residents' needs.
- Consider children and youth a priority for primary prevention programs. Adults, especially those in transition periods in their lives, are the second priority. The needs of these groups may be met best by addressing them in the context of their families, communities and society.
- Implement programs and policies now; current research about primary prevention of Type 2 diabetes indicates that action is required.
- Apply behaviour change theories to improve effectiveness of programs for both groups and individuals.
- Participate in development and implementation of healthy public policies that promote physical activity and healthy eating.

Priorities for Primary Prevention of Type 2 Diabetes

This section outlines broad goals and specific objectives to reduce the risk of developing Type 2 diabetes. It then goes on to summarize recommended strategies and actions to achieve the objectives. More detailed analysis of the issues is found in Appendix 1.

The following are priorities when developing programs for primary prevention of diabetes:

- Physical activity is a high priority because it affects insulin metabolism and helps to control body weight. This is important for both children and adults.
- Prevention of obesity, especially among children, is a second priority. For the general population of adults, the goal may be more to encourage habits that do not contribute to gaining weight rather than reducing weight. Obese adults at high risk for diabetes may be advised to reduce weight.
- The third priority is to promote a nutritious diet, as outlined in the Nutrition Recommendations for Canadians. These recommendations emphasize maintenance of a healthy body weight and enjoying more vegetables, fruit and whole grains while limiting the amount of fat.

Promotion of physical activity, healthy body weight and good nutrition is a priority for a number of agencies in the province. Saskatchewan Health needs to work cooperatively with groups that have similar goals so that the maximum benefit can be achieved.

In addition to the specific risk factors, it is clear that the determinants of health such as employment, education, income and social support networks affect the ability of individuals, families and communities to reduce risk and achieve and maintain good health.

The emphasis here is on population-wide approaches to alter the environment to make healthy choices easier. This reduces the risk of developing diabetes and other chronic illnesses for almost everyone. It is extremely difficult to make changes while living in an environment that encourages physical inactivity and obesity. There is still a need for some programs for those population subgroups and individuals at particularly high risk.

Recommendations for Primary Prevention of Type 2 Diabetes

An analysis has revealed that there are a number of specific risk factors that can be addressed. Reaching the goals and objectives that follow will significantly improve the health of Saskatchewan people. Although the timelines may appear long, achieving them will require that substantial action begin immediately on many fronts! Those who are developing and implementing programs will need to develop some short-term objectives as well.

Diabetes and Incidence Rates

In 1996 the incidence (new cases) of diabetes in Saskatchewan was 3.1 per 1000 people. The age-sex adjusted incidence rate among First Nations people was more than double that of the general population. Without interventions, these rates are expected to continue to rise as the population ages plus it is anticipated that a larger proportion of people who have diabetes will be identified through improved screening.

GOAL 1

The primary goal is to reduce the rate at which Saskatchewan people develop Type 2 diabetes and to delay the onset for others in spite of the expectation of a significant increase in incidence rates for diabetes.

Objective 1.1

Reduce age-adjusted incidence of Type 2 diabetes to 2.8 per 1000 people (a 10 percent reduction) by 2010.

Physical Activity

Adequate physical activity for the purpose of this section is defined as 60 minutes or more per day of light activities such as slow walking; or 30 - 60 minutes of moderate activity such as brisk walking, bicycling or swimming; or 20 - 30 minutes of activities such as running, playing hockey or basketball (Health Canada, 1999).

A study by the Heart and Stroke Foundation found that only 63 percent of Canadian children are sufficiently physically active. Canadian children are less active with age. Children aged one to four spend almost 22 hours per week in physically active play but teenagers spend only 14 hours per week (Canadian Lifestyle and Fitness Research Institute, May 1998). Teenaged girls are less active than boys are.

The Canadian Fitness and Lifestyle Research Institute found that in 1995 only 37 percent of Saskatchewan adults were physically active enough to be considered healthy. This was the lowest rate for any province or territory! An additional concern is the number of people who are extremely sedentary. American studies showed that 24 percent of people aged 18 and over did not engage in even one hour of recreational activity per week.

GOAL 2

Saskatchewan residents will engage in health-enhancing levels of physical activity. The needs of children are considered to be particularly urgent.

Objective 2.1

Increase to at least 85 percent the proportion of children and adolescents aged 6 to 17 who are physically active (according to *Canada's Physical Activity Guide*) by 2010.

Objective 2.2

Increase to 99 percent the proportion of primary schools that implement the requirement of 150 minutes of physical education (primarily actual physical activity) per week by 2003.

Objective 2.3

Increase to at least 50 percent the proportion of people aged 18 and older who are physically active by 2010.

Healthy Body Weights

The current Canadian healthy body weight range for people aged 18 to 65 is a body mass index (BMI) of 20 to 25 with values between 25 and 27 being considered a caution zone that may lead to health problems in some people. BMIs above 27 have increased risk of developing health problems. Body mass index is weight in kilograms divided by height in meters squared. For example, someone 1.7 meters (67 inches) tall, weighing 65kg (143lb) would have a BMI of $[65/(1.7)^2]$ 22.5. In the future we may adopt international standards for which recommended BMI is 19 to 25 (WHO, 1998).

Standards for adolescents are harder to determine because of changes in body composition during puberty. Until Canadian standards are established, overweight among adolescents is considered to be above the 85th percentile of the 1976 NHANES II BMI levels for age and sex (WHO, 1998).

The 1990 Saskatchewan Heart Health studies found that 45 percent of males and 52 percent of females aged 18-34, 23 percent of males and 42 percent of females aged 35-64 and 31 percent of males and 32 percent of females aged 65- 74 had a BMI of 20-25. A Montreal study found that one third of students in grades four through six are overweight and 14 percent are obese (O'Loughlin, 1998).

American studies showed in 1985 that 30 percent of overweight women and 25 percent of overweight men were physically active and had sound dietary practices to avoid further weight gain (Gortman et al., 1990).

GOAL 3

The proportion of Saskatchewan residents who have a healthy body weight will increase significantly.

Objective 3.1

Increase the proportion of Saskatchewan people with a healthy body weight, by 2010, to the following:

- 85 percent for adolescents aged 12-17;
- 55 percent for men and 62 percent for women aged 18-34;
- 35 percent for men and 50 percent for women aged 35-64;
- 38 percent for men and 38 percent for women aged 65-74.

Objective 3.2

At least 50 percent of overweight people aged 12 and older will have adopted regular physical activity and sound dietary practices to attain a healthy body weight or to avoid further weight gain by 2010.

Nutrition

A nutritious diet is consistent with the *Nutrition Recommendations for Canadians*.

Food security, defined as having access to sufficient, personally acceptable, nutritious food is essential for good nutrition.

In 1985, studies of American women showed daily consumption of two and a half servings of vegetables and fruit and three servings of grain products. Results of the Saskatchewan Nutrition Survey are expected in 2000.

GOAL 4

The proportion of Saskatchewan residents who eat a nutritious diet will increase significantly.

Objective 4.1

At least 45 percent of people aged 12 and older will have dietary fat intakes at or below 30 percent of energy (total calories) by 2010.

Objective 4.2

At least 60 percent of Saskatchewan residents will eat five or more servings of vegetables and fruit and five or more servings of grain products daily by 2010.

Implementation Objectives for Saskatchewan Health

Two specific implementation objectives are suggested for Saskatchewan Health. Other partners are encouraged to establish their own implementation goals and objectives.

GOAL 5

Saskatchewan Health will initiate or facilitate primary prevention programs and promote research to reduce the incidence of Type 2 diabetes.

Objective 5.1

Saskatchewan Health, with other government and non-government partners, will develop and begin to implement a program to reduce the incidence of Type 2 diabetes by 2000. This program will include:

- Funding demonstration sites in selected health districts to reduce the risk factors for Type 2 diabetes using a population health approach;
- In cooperation with partners, developing and implementing a plan to communicate with those who can effect change about best practices in primary prevention of diabetes;
- Supporting initiatives to share information from the demonstration sites and other sources with health and other professionals and leaders who work directly with citizens about how the risk of developing Type 2 diabetes can be reduced.

Objective 5.2

Saskatchewan Health will inform, by 2000, the research divisions of Health Canada that more research in the following areas would be beneficial for development and implementation of diabetes prevention programs:

- What types of environments promote obesity and how they can be altered;
- Successful intervention strategies for reducing risks among those living in poverty or with differing cultural practices;
- Dietary guidance for primary prevention of Type 2 diabetes in Canada.

Actions Utilizing a Population Health Approach to Accomplish Objectives

In order to achieve the goals and objectives a number of actions will be required. They will affect individuals, families, communities and society.

A number of strategies that affect essentially all residents are recommended.

- Inform the public, health and other professionals and the media how Type 2 diabetes can be prevented or delayed for many. This is not widely known at present.
- Provide health and other professionals such as teachers and the media with information and materials that will enable them to facilitate development of healthy individuals and communities.
- Support health promotion programs that emphasize the value and pleasure of life-long physical activity. Education, incentives and skill development must be supported for all population groups so that they can incorporate physical activity into daily life. This includes workplaces, schools and sites for leisure activity.
- Facilitate programs that support Saskatchewan residents' access to sufficient, personally acceptable, nutritious food. This includes making nutritious choices available in public facilities, grocery stores and community food programs.
- Saskatchewan Social Services and Education and many not-for-profit and community groups have lead roles in food security issues. Policies and programs that support access to food are important for all communities.
- Develop policies and programs that support increased consumption of vegetables, fruit and cereal grains and discourage consumption of excessive amounts of fats and energy (total calories).
- Advocate for more research to improve the effectiveness of primary prevention programs.

Suggested Strategies for Specific Groups

There is still a need for programs for those populations presenting important opportunities for primary prevention.

Suggested Strategies for Children and Youth

Children and youth have a very high priority. Many health habits are established at a young age. Since children depend on their families, communities and society as a whole for support, it is imperative that approaches create healthy environments for children. It is especially important that environments that promote childhood obesity be improved because long term success rates from weight reduction programs are so poor.

The need to focus on children and youth is further emphasized by the fact that Type 2 diabetes is beginning to be diagnosed at much younger ages. This includes a significant number of adolescents.

Actions:

- Encourage and enable children to be physically active for at least 30 to 60 minutes per day. This may involve schools, community facilities, family activities, and outdoor play with friends. It may require strategies to remove or reduce financial barriers such as equipment costs or facility fees. It may also require discussion with parents about how to increase their children's activity levels.
- Implement school policies that provide at least 30 minutes of actual physical activity each day. This does not include preparation time. (Primary schools are required to provide physical education, but policies may not always be followed. Physical activity in high school is not consistent.) Programs such as *Quality Daily Physical Education* should be expanded as quickly as possible.
- Leisure time activities that are sedentary, such as watching television and playing video and computer games, should be monitored and limited. Encourage more physically active leisure activities.
- Include age-appropriate education about physical activity and nutrition in schools.
- Develop advertising codes for food advertisements targeted towards children.
- Collect data for body weights of Saskatchewan children and youth in order to support program development.
- Design healthy body weight programs in ways that do not further exacerbate the problems of eating disorders and distorted body images.

Suggested Strategies for Adults

Almost all of the people who develop Type 2 diabetes are adults. Even those with impaired glucose tolerance can significantly reduce their risk of developing diabetes (Pan et al., 1997). Therefore, primary prevention of diabetes is a consideration for adults. People in their twenties and fifties are of particular interest because these ages tend to be times of change or transition for many adults.

Actions:

- Implement *Canada's Physical Activity Guide* at both provincial and local levels. Municipal Government is the lead agency for this initiative.
- Develop innovative approaches in workplaces and community settings to encourage adults to be physically active and eat in ways that promote healthy weights.
- Encourage adults who have a healthy body weight to maintain it. Adults who are already overweight should be encouraged not to gain additional weight if achieving a healthy body weight is not feasible.
- Provide primary care practitioners with materials and education that will enable them to identify those at high risk of developing diabetes and then refer or counsel those identified.

Suggested Strategies for Those at High Risk Because of Socio-economic Status, Culture or Education

Traditional risk reduction programs have had very limited success with groups of people with lower socio-economic status or education or differing cultural practices. A national working group on Aboriginal diabetes prevention points out that it is essential to deal with underlying determinants of health, include the formal and informal leaders in communities and recognize the need for culturally appropriate programs developed with participants' input (Working groups of the National Aboriginal Diabetes Strategy, 1998).

Actions:

Design programs to prevent Type 2 diabetes to meet the requirements of special needs groups by involving potential participants and their leaders in the development and implementation. Work in ways that develop the strengths of individuals and groups so that they can make many of the changes for themselves.

Conclusion

Because all Saskatchewan citizens who do not already have diabetes can be considered to be at risk of developing Type 2 diabetes, it is essential that measures be taken now to reduce these risks. Reducing the risk of developing Type 2 diabetes requires action at national, provincial, health district, community, family and individual levels. Partnerships with others outside the health sector are essential if progress is to be made.

Everyone with an interest in this important subject is challenged to take action to reduce the risks of developing Type 2 diabetes!

References – see Appendix 3

EDUCATION, CARE AND TREATMENT

- *Introduction*
- *Evidence for Decision Making*
- *Recommendations for Education, Care and Treatment*
  - *General Objectives*
  - *Determinants of Health*

Education, Care and Treatment

Introduction

The members of the Education, Care and Treatment Working Group are committed to helping the Saskatchewan Advisory Committee on Diabetes achieve its vision. Our work has focused on meeting the needs of people affected by diabetes, defined as people with diabetes, family members, other care givers and health professionals.

The mandate of our working group was to:

- Do an inventory of services available for people with diabetes in Saskatchewan;
- Develop an assessment of current services;
- Identify gaps and issues;
- Make recommendations related to a new model of service delivery and the human resources required to support that new system.

As well the working group was asked to make recommendations related to continuing education for physicians, diabetes educators and other health care providers and to the implementation of standards and guidelines for diabetes care in Saskatchewan.

The presentation of the data and recommendations uses a population health approach. To strengthen the recommendations, they are linked to the recommendations with specific national standards in either the *Clinical Practice Guidelines for the Management of Diabetes in Canada* (CPG) (Meltzer et al., 1998) or the *Standards for Diabetes Education in Canada* (SDEC) (1995).

Evidence For Decision Making

Recent research has provided the basis for decision making and recommendations from the Education, Care and Treatment Working Group.

Standards for Care and Education

In the review of evidence to support action, two sets of standards are critical.

Clinical Practice Guidelines for the Management of Diabetes in Canada (1998)

The CPGs were published in 1998 in the Canadian Medical Association Journal. The 1998 Guidelines, developed by an expert panel, are evidence-based whenever possible and contain 93 recommendations for care and practice. Each recommendation is graded (A-D) to indicate the degree of scientific and consensus support and the report details the extensive methodology used to determine the grade for each recommendation.

Standards for Diabetes Education in Canada (1995)

These Standards are the foundation of the Diabetes Education Services Self-Assessment and Recognition program in Canada. Between October, 1993 and September, 1995, the Standards were developed through extensive participation of the Canadian Diabetes Association's Diabetes Educator Section (DES) members across Canada in focus groups, two total membership surveys and pilot testing at four Diabetes Education Centres.

The Standards flow from the DES statement of beliefs and are articulated in terms of desired outcomes, processes and structures. The Recognition Program uses both quantitative and qualitative indicators to determine how the standards are being met.

Selected Standards were used as part of the data collection process. The document has standards for outcome, process and structure.

Type 1 Diabetes Control - The Diabetes Complications and Control Trial

The Diabetes Complications and Control Trial (DCCT) was a nine-year prospective study with over 1400 individuals with Type 1 diabetes (The Diabetes Control and Complications Trial Research Group, 1993). Half the subjects were enrolled in a standard treatment program (twice-daily insulin injections) while the others were intensively treated (multiple daily insulin injections or insulin pump therapy). The DCCT's results clearly demonstrated that intensive treatment of individuals with Type 1 diabetes delays the onset and progression of long-term complications in those without complications and in those with early complications.

Intensive therapy included not only more frequent doses of insulin per day, but also self-adjustment of insulin according to meal content, exercise activity and glucose levels, frequent dietary instruction and monthly clinic visits. Table 1 illustrates the benefits in reduction of complications.

Reproducing the results of the DCCT in the community requires several key ingredients.

1. Individuals with diabetes who are motivated to achieve and sustain improved control.
2. The support of a multi-disciplinary team with, as a minimum, an endocrinologist, a diabetes nurse educator/clinician and a dietitian. Other consultants include ophthalmologists, psychologists, social workers, public health nurses, podiatrists and pharmacists.
3. Sufficient resources for both the individual with diabetes and the health care team to support intensive therapy. Optimal diabetes control individuals requires frequent blood glucose monitoring (four to eight times daily) and frequent insulin injections. Regular, timely access to the health care team for ongoing education and support is also essential.

Table 1 Effect of Intensive Therapy on Microvascular Complications in the DCCT

• **Retinopathy** (eye disease)	
— Reduced clinically meaningful Retinopathy by	34-76%
— Reduced proliferate retinopathy and laser therapy by	45%
— Reduced the first appearance of any retinopathy by	27%
• **Nephropathy** (kidney disease)	
— Reduced microalbuminuria by	35%
— Reduced clinical grade albuminuria by	56%
• **Neuropathy** (nerve damage)	
— Reduced clinical neuropathy by	60%

Source: Zinman B, Morrison A, Dupre J (1993).

Type 2 Diabetes Control - The United Kingdom Prospective Diabetes Study

The United Kingdom Prospective Diabetes Study (UKPDS) was conducted over a 20 year period and involved 5,102 participants with newly diagnosed Type 2 diabetes from 23 different centres (United Kingdom Prospective Diabetes Study Group, 1998). Participants were followed for an average of ten years. The study showed that better blood glucose control in people with Type 2 diabetes reduced overall microvascular complications by 25 percent. The study also showed that reducing blood pressure reduced the risk of stroke, microvascular complications and diabetes related mortality. For every percentage decrease in HbA_1c, there was a 21 percent reduction in any diabetes-related endpoint hazard ratio ($p<0.001$).

The results of the UKPDS, as illustrated in Table 2, have already led to revision of the *Canadian Clinical Practice Guidelines* (CPG). The article recommending revision of the CPGs states "If implemented, these revised guidelines, in addition to the original guidelines will clearly decrease the burden of chronic disease attributable to diabetes in Canada. The task at hand is to disseminate these guidelines and to uncover both easier and more effective ways of implementing them" (Gerstein, Hanna, Rowe, Leiter, MacGregor, 1999, p. 17).

Table 2 Main Results of the UKPDS related to blood glucose control

Hemoglobin A_1c for every percentage point decrease	
• complications were reduced by	35%
• diabetes related deaths were reduced by	25%
• all cause mortality was reduced by	7%
Retinopathy - the relative risk reduction (RRR) was	
• for retinal photocoagulation	19%
• for cataract extraction	24%
• for progression of retinopathy over 12 years	21%
Nephropathy - the relative risk reduction (RRR) was	
• for the development of microalbuminuria	33%
• for number of patients who doubled their creatinine value over 12 years	74%
Neuropathy - the relative risk reduction (RRR) was	
• for sensory nerve function deterioration	40%
Cardiovascular Disease - the relative risk reduction (RRR) was	
• for development of myocardial infarction	16%
• for sudden death	53%

The UKPDS also examined results with a tight blood pressure control policy in people with Type 2 diabetes. These results are equally impressive with a relative risk reduction of 37 percent for development of microvascular disease; 34 percent for the progression of retinopathy by 7.5 years; 29 percent for development of microalbuminuria over six years; 44 percent for fatal or non-fatal stroke.

Canadian clinicians have concluded that results of the UKPDS indicate that:

- Physicians must be aggressive in treating both diabetes and hypertension;
- Oral agents and insulin may need to be added earlier in treatment than previously thought;
- It is time for all health professionals to treat both diabetes and hypertension aggressively;
- It is time for patients with Type 2 diabetes to take their condition more seriously; and
- Patient education and self-management need to be encouraged. (Ludwig & Ash, 1998).

Other Research

Key research results will be reported for two other areas:

- Benefits and outcomes from diabetes education;
- Cost-benefits of treating diabetes with particular emphasis on preventative foot care.

Benefits and Outcomes of Diabetes Patient Education

Diabetes requires daily decision making by those who have it. People with diabetes provide 95 to 99 percent of their own care. The benefits of the DCCT and UKPDS reported above occurred not only as a result of the intensity of metabolic control but also as a result of the increased intensity of the involvement of the people with diabetes in their own care. This increased intensity of involvement required both initial and continuing education with regular follow-up.

DCCT and UKPDS results also support the use of a team approach to education, care and treatment of diabetes. In the DCCT, the intensity required to improve outcomes fostered a team approach. Many of the DCCT teams needed to redefine their roles and functions. For example, nurses and some dietitians made insulin dose recommendations. Other studies in the area of nutrition and interventions by dietitians have demonstrated positive outcomes: improved metabolic control, cost-effectiveness of interventions. (Beeney, Bakry, Dunn, 1996; Johnson, 1995; Keen, 1996; Monk, Barry, McClain, Weaver, Cooper, Franz, 1995; Funnell, 1996; Santiago, 1993; The DCCT Research Group, 1994).

Meta-analyses have shown improvements as a result of patient education in knowledge, weight loss, metabolic outcomes and coping/psychosocial outcomes (Brown, 1990; Padgett, Mumford, Hynes, Carter, 1988).

Cost Effectiveness of Diabetes Care and Treatment

In the United States it is estimated that per capita health care expenditures for the medical care of diabetes is 2.5 times higher than for people without diabetes. About half of those expenditures are for the actual treatment of the condition, and the remaining half is for the treatment of chronic complications (DCCT Research Group, 1995; American Diabetes Association, 1997).

In a study, which examines the effects of intensive treatment on the costs of diabetes, the authors conclude that intensive therapy, while cost effective for both Type 1 and Type 2 diabetes, is slightly more cost-effective for Type 2 because of its lower estimated treatment costs and shorter duration of treatment. Further, the authors conclude that implementation of intensive therapy would improve both quality of life and length of life. Intensive therapy represents a good monetary value for the investment (Herman & Eastman, 1998).

The International Diabetes Federation (IDF) has documented some important facts to be considered in terms of cost-effective measures for improvement of diabetes control:

1. The costs of diabetes are various, widespread and growing. Adding up the costs of diabetes means accounting for the direct costs to people with diabetes and their families, the indirect costs to society and the direct costs to the health care sector.

2. Action taken early in the course of diabetes is more beneficial in terms of quality of life and most cost effective, especially if this action can prevent hospital admission.
   - The diabetes complications for which prevention is most cost-effective are retinopathy and foot ulceration and amputation. Population based screening and therapy programs for retinopathy are particularly cost-effective, given the devastating direct, indirect and intangible costs of blindness. Foot ulceration and amputation are among the most costly diabetic complications. Foot care services reduce both the length of hospital stays and amputation rates in people with diabetes by as much as 50 percent. The relatively low cost of education, footwear and treatment make the prevention of foot ulceration and amputation highly cost-effective.
3. Improved glycemic control is an important means of reducing costly hospital care of people with diabetes (International Diabetes Federation, 1997; Mayfield et al., 1998).

Recommendations for Education, Care and Treatment

General Objectives

In order to address the determinants of health related to diabetes education, care and treatment, resources will be needed. On February 16, 1999 the federal government announced that it would commit $55 million to confront the issue of diabetes in Canada over the next three years. On November 19, 1999 the federal government announced that this amount would be increased to $115 million over five years.

Diabetes has finally made it onto the national health agenda in Canada. It is important that we seize on this opportunity to secure additional support for improvements to services for people affected by diabetes.

GOAL 1

Ensure that adequate funds and appropriate resources are committed for the effective implementation of the recommendations of the Saskatchewan Advisory Committee on Diabetes in the short, medium and long term.

GOAL 2

Collaborate with the federal government to acquire adequate funding for an optimal system of health service delivery for diabetes.

Objective 2.1

Attempt to secure directly or indirectly through support to other groups at least three percent of the funds the federal government has designated for non-Aboriginal diabetes prevention and health promotion to implement the recommendations of the Saskatchewan Advisory Committee on Diabetes.

Objective 2.2

Support Aboriginal peoples in the province in securing at least 10 percent of the monies designated for Aboriginal health and diabetes in the Aboriginal Diabetes Initiative of the CDS.

Determinants of Health

HEALTH SERVICES

The Working Group has undertaken an extensive review of the current services for diabetes education, care and treatment. The major results and conclusions are reported in five sections. Appendix 2 provides further details from the data collection.

Current status of Diabetes Education Programs and staffing

Several methods were used to collect data about current programs and staffing. The methods included: 1) mailed surveys to a random sample of 100 family physicians, 2) a mailed and follow-up telephone survey with all health districts, Tribal Councils and Reserves and 3) a detailed Utilization Study of Diabetes (USD) in eight health districts which represented the diversity of programs and services. Detailed results are in Appendix 2. A summary of key conclusions is presented here.

In the data analysis it was evident that diabetes education is provided by two groups of health professionals. Primary diabetes educators are nurses and/or dietitians who devote a dedicated portion of their work time specifically to diabetes education. Secondary diabetes education refers to others who provide some diabetes education amongst many other activities in their job description (examples include acute and home care nurses, inpatient dietitians, and community pharmacists).

Diabetes Education Programs/Services

Based on responses from all 32 health districts.

- All health districts provide some diabetes education. There are no common standards or programming.
- Although national standards exist for diabetes education, these have not been implemented in any diabetes education program in Saskatchewan. A few programs have used the standards for program development.
- There are four full-time programs in the province (Moose Jaw, Prince Albert, Regina, Saskatoon). All others are part-time. Most programs provide both inpatient and outpatient services, but the greatest focus is on outpatients/community programming. In extreme circumstances where clients cannot travel to the diabetes education service, some programs are willing to do home visits, but this is very limited due to travel distances and staff time.
- Most health districts have a central program and staff travel, at least monthly, to other communities within the health district to provide easier access. The programs that do not routinely travel, most often stated that this was related to management of their waiting lists (East Central, Moose Jaw, North Battleford Prince Albert, Regina, Saskatoon).
- 78 percent (25 of 32) of programs accept self-referrals from people with diabetes and other programs are trying to achieve this. Programs that do not accept self-referrals and require physician referral are anxious to see an "open" referral policy.
- Statistical data about diabetes education services are not kept in a uniform way. It is therefore not possible to produce data that will provide an overall picture about diabetes education services in Saskatchewan. The survey requested basic information about inpatients seen, numbers of new

referrals, outpatients seen etc. Only 14 percent of programs could provide complete data about services, 45 percent provided incomplete data and 41 percent did not collect any statistical data.

Access to Services and Waiting Lists

- The major barriers to access described by both people with diabetes and health professionals were need for physician referral for education, transportation or travel distance to service, waiting lists and lack of knowledge about the availability of education programs.
- Most programs do limited promotion of their services. The programs may not have the time or resources to invest in promotion or may feel that they will be unable to handle the additional workload generated as a result of the promotion.
- 59 percent (19 of 32) of programs identified waiting lists for services (spring, 1998).
- During the utilization study (winter, 1999) two health districts indicated new waiting lists. These programs identified implementation of the new *Clinical Practice Guidelines* (CPG) with earlier diagnosis of diabetes and diagnosis of IFG and IGT as adding numbers to their referrals. This trend is likely to increase in all health districts as the CPGs are implemented.
- Seven of eight health districts in the utilization study now have waiting lists. The length of waiting varies from 3 to 12 weeks (February 1999).
- Programs that have had ongoing waiting lists, have all implemented strategies to improve their efficiency and hopefully shorten the wait for clients; including group intake classes, group follow-up sessions, re-organizing of programming and staff utilization. Programs report that these measures have had some impact on containing the wait, but peaks still occur and it is not always possible to control the waiting period.
- Access to services for people is provided by both primary and secondary personnel concerned with diabetes education, care and treatment. Summary of key data from health districts participating in the utilization study is in Appendix 2. It shows that for the USD meeting the national standards depended on both primary and secondary diabetes education services. Most diabetes educators say they do not have the resources to provide regular continuing education to the secondary educators (acute care and Home Care nurses, pharmacists, physical and occupational therapists).
- Persons with newly diagnosed Type 1 diabetes, particularly children, and pregnant women with pre-existing diabetes are generally referred to a larger centre - usually Regina or Saskatoon.
- Self-referrals were accepted by 78 percent of the programs in 1999.

Staffing for Diabetes Education Programs

- The recommended core staffing for a diabetes education program includes both a dietitian and nurse educator with specialized knowledge and expertise in diabetes education, care and treatment. Each profession brings unique skills and expertise.
  - — 31 of 32 health districts have a dietitian. In rural health districts this dietitian is usually the only dietitian for the whole health district and provides services to all those with nutrition related health issues. These dietitians spend from 35 to 90 percent of their time working with people with diabetes.
  - — 10 of 30 health districts do not have a diabetes nurse educator. This gap is filled, or not, in various ways - admission to Hospital, admission to Home Care, dietitians and other professionals

assuming a portion of the diabetes education that would be best handled by a diabetes nurse educator. The need for the dietitians to also be nurse educators is at the expense of time they could devote to nutrition-related topics, assessments and education. Many dietitians indicated that they do not feel competent to perform assessment and care usually done by a diabetes nurse educator. Two of the health districts that participated in the Utilization Study, that do not have nurse educators, do not provide outpatient initiation of insulin therapy.

- Information from the provincial program in Nova Scotia showed a range for the ratio of staff to people with diabetes of 1:636-925. The highest ratio is in the region with the urban tertiary referral centre. The average ratio is 1:838.
- Manitoba, which has a similar population of people with diabetes, has developed three recommended ratios based on ten years of experience:
  - 1 FTE to 800 people with diabetes in urban centres (Winnipeg, Brandon);
  - 1 FTE to 600 people with diabetes in rural areas;
  - 1 FTE to 300 people with diabetes in northern areas.
- In Saskatchewan the current ratio of diabetes educators (1999 numbers) to people diagnosed with diabetes (1996 numbers) is 1 FTE to 1312 people with diabetes.
- The current Standards for Diabetes Education in Canada have been, at best, only partially implemented in programs in Saskatchewan in 1998.

GOAL 3

Provide a comprehensive coordinated approach to diabetes education, care and treatment through the creation of a provincial diabetes coordinating body.

Objective 3.1

Establish a provincial diabetes coordinating body, funded by Saskatchewan Health and accountable to the Minister of Health that has a governing board and full time staff by 2000.

> Existing provincial programs in Nova Scotia and Manitoba have made significant strides in outcomes for the education, care and treatment of people with diabetes (see Appendix 2).

The major functions of the provincial diabetes coordinating body will be:

- Serving as a resource to diabetes educators and other health care professionals;
- Supporting and monitoring the implementation of existing standards and guidelines related to education, care and treatment of diabetes;
- Facilitating health professional continuing education and liaison with professional colleges and schools;
- Establishing a system for data collection in cooperation with the diabetes education programs;
- Monitoring access to and use of diabetes education programs;
- Ensuring culturally appropriate programming and access to programs;
- Recommending appropriate staffing and other resource needs;
- Supporting program evaluation by assisting in tracking outcomes from diabetes education programs;

- Facilitating research;
- Enhancing the use of technology in diabetes education, care and treatment, for example, telehealth; and
- Establishing criteria and responsibility for key physicians and options for remuneration.

The provincial diabetes coordinating body will exchange information and work in a cooperative manner with:

- The diabetes education programs in the health districts;
- Aboriginal organizations;
- Provincial government branches within Saskatchewan Health;
- Non-governmental organizations.

In order to carry out these functions, the provincial diabetes coordinating body will require:

1. Dedicated staff and an operating budget. The following staff members are recommended:
   - Diabetes Nurse Educator;
   - Dietitian;
   - Aboriginal Health Educator;
   - Endocrinologist;
   - Clerical support;
   - Statistician (may be a joint appointment with Provincial Epidemiologist's Office).

2. A governing board that is a representative mix of stakeholders similar to the make-up of the Saskatchewan Advisory Committee on Diabetes.

GOAL 4

Ensure every person with diabetes in Saskatchewan has timely access to quality diabetes education services as required.

Objective 4.1

Ensure each Health District has a diabetes education program staffed with both a dietitian(s) and diabetes nurse educator(s) by 2002.

CPG recommend a core team as physician, dietitian and nurse educator.

Objective 4.2

Ensure an adequate ratio of diabetes education staff to people with diabetes by 2002.

Manitoba's recommended standard for the ratio of diabetes education staff to people with diabetes is: 1 FTE: 800 in urban centres; 1 FTE: 600 in rural communities and 1 FTE: 300 in northern Saskatchewan (Manitoba Health, 1998).

In Saskatchewan in 1999 the overall ratio of educator to people with diabetes is 1:1312; the urban ratio is 1:1178; the rural ratio is 1:1312; and the northern ratio is 1:1320. All ratios using 1999 staffing data and 1996 data for the number of people with diabetes.

Objective 4.3

Create an "open" referral policy to diabetes education programs and diabetes counselling, in all health districts where such a policy does not already exist by 2001.

Objective 4.4

Implement the current *Standards for Diabetes Education in Canada* in all diabetes education programs in Saskatchewan with support from the proposed provincial diabetes coordinating body by 2004.

Specialist Services for Diabetes

Diabetes is a complex chronic illness with both major short and long-term implications. People with diabetes need the support of an interdisciplinary team of health and other professionals who are expert in total care for diabetes. Central to care is the person with diabetes. Also at the core are the primary care physician (who may be a diabetes specialist), the diabetes medical specialist (endocrinologist and/or internist) and diabetes educators (nurse and dietitian). An expanded health care team may include others such as ophthalmologists, cardiologist, neurologist, nephrologists, obstetricians, social workers, psychologists, pharmacists, podiatrists and optometrists (Meltzer et al., 1998, p.3).

In the review of Saskatchewan specialists' services, the focus was on three priority need areas: endocrinologists, podiatrists and an expanded role for nurse educators. The need for dietitians and nurse educators has already been discussed.

Current Status of Endocrinology Services

The urgent need for more endocrinologists was outlined in the Interim Report of the Committee. In the survey of family physicians, a striking 82 percent of respondents reported major dissatisfaction with the availability of endocrinology services in the province (SACD Interim Report, 1998).

Currently the Royal College of Physicians and Surgeons recommends, for adult coverage, one endocrinologist per 80,000 population. For Saskatchewan, with a covered population of 1,041,256 to meet that standard, twelve endocrinologists would be required. Saskatchewan currently has four adult endocrinologists or 1:260,314 population - a situation that must be considered unacceptable. Another specialist is reported to be coming on stream soon in Saskatoon. This will of course be very helpful, but the need for more will still be great.

The recommendation for the ratio of 1:80,000 was devised prior to the development of many new and time consuming aspects of endocrine practice, in particular the recognition of the necessity for intensive treatment of diabetes. The table below lists the current staffing for both our province and our

neighbouring provinces. Endocrinologists in both Manitoba and Alberta describe the heavy workload, long waiting lists of their colleagues and the need for additional staff in their units and geographic areas, despite their better current endocrinology staffing levels.

For pediatric endocrinology Saskatchewan has one physician. This compares with two in Manitoba and five in Alberta. Considering our geography, Saskatchewan would benefit from one in Regina and one in Saskatoon. It is impractical for one physician to try to serve both centres. The survey of health districts indicated that children are routinely referred to either Regina or Saskatoon on diagnosis. Children and their families in the south of the province do not have ready access to a pediatric endocrinologist. This is an additional stress for the families and may impact both the quality of care and the opportunity for follow-up care. The CPGs recommend that all children with diabetes have access to an experienced diabetes health care team. The complex physical, developmental and emotional needs of children and their families require specialized care to ensure the best long-term outcome.

Table 3 Recommendations for Endocrinologists for Adult Patient Care

Source: Royal College of Physicians and Surgeons

Province	Royal College Recommends	Current Number	Populations	Ratio of Endo to Pop
Manitoba	14	12.5	1,113,898	89,112
Alberta	34	26	2,696,826	103,724
Saskatchewan	12	4	1,041,256*	260,314

** (1999 covered population)*

GOAL 5

Ensure all people with diabetes in Saskatchewan have access to specialized services needed in the diagnosis and management of diabetes related complications and associated conditions.

Objective 5.1

Ensure eight adult and two pediatric endocrinologists are practicing in Saskatchewan by 2004.

Action 5.1.1

Form a task force, which will include Saskatchewan Health, the College of Medicine University of Saskatchewan, health districts, representatives of practicing endocrinologists, family physicians and other stakeholders. Their purpose will be to design, implement and evaluate a recruitment and retention strategy, including remuneration options.

Objective 5.2

Establish as the collective mandate of endocrinologists in Saskatchewan to:

- Provide a consultation practice in endocrinology, prominently in diabetes;
- Play an educational role involving the general public, people with diabetes, colleagues in practice, medical residents, undergraduates in medicine, diabetes educators and other health care professionals;
- Play an organizational and support role to health district diabetes education programs including interactions with those key physicians who are the local resources; (see Goal 8)
- Be involved in research, particularly for those with a university affiliation.

Endstage Renal Disease Services in the Province

The Provincial Integrated Renal Program Steering Committee has the task of better integrating and improving services available to patients and individuals at risk of end-stage renal disease. The Committee is made up of four nephrologists, senior administrators from the Saskatoon and Regina districts, a senior administrator representing districts providing satellite dialysis, the Saskatchewan Kidney Foundation, a client representative and Saskatchewan Health. The Steering Committee advises the districts and the department on all aspects of the integrated renal program – prevention, dialysis, transplant and organ donation and research. The treatment modalities for people with kidney failure that are addressed include conservative therapy (prevention and delay of onset); hemodialysis; peritoneal dialysis; and transplantation.

Four Working Groups report to the Steering Committee:

- Prevention and Early Detection Working Group;
- Dialysis Working Group;
- Transplantation Working Group; and
- Research Working Group.

Each Working Group is co-chaired by a nephrologist and a senior administrative representative from the districts.

Nephrologists are currently available in Regina and Saskatoon and they provide clinical supervision for dialysis satellites in Prince Albert, Tisdale, and Yorkton. The satellite service in Lloydminster is supervised by the University of Alberta. The Dialysis Working Group has the task of reviewing the need for satellite services in the context of development of new sites as well as expanding existing operations (i.e. from three days per week to six days per week). The Renal Satellite Unit Guidelines which outline the administrative policies, relationship with the home unit, patient selection criteria, and patient consent may be reviewed and modified periodically by the Steering Committee on the advice of the Dialysis Working Group.

Improving the awareness for the need for organ and tissue donation is one of the tasks of the Transplantation Working Group. Organ donor coordinators in the Regina and Saskatoon districts are

available to work with districts to train hospital staff and to work with patients who are interested in kidney and other transplants.

The importance of maintaining a link between the activities directed towards diabetes and the activities of the Integrated Renal Program Steering Committee is evident from the 1999 Canadian Organ Replacement Register. It indicated that diabetes was the primary renal disease of new endstage renal disease patients – that in Canada it accounted for 29 percent of new patients and that in Saskatchewan diabetes accounted for 40 percent of new patients.

It has been clearly demonstrated that meticulous control of diabetes, if more universally applied, could prevent, at least over a period of 10 years, the development of the majority of cases of serious diabetic kidney disease.

Because a provincial structure (the Provincial Integrated Renal Program Steering Committee) is in place to deal with services for persons with endstage renal disease, including the cases caused by diabetes, the SACD did not analyse this aspect of care and treatment services and will therefore not be making any recommendations in this area.

Podiatry Services in Saskatchewan

Foot problems are a major cause of morbidity and mortality in people with diabetes and contribute to health care costs. Foot complications are a major reason for admission to hospital of people with diabetes and account for approximately 20 percent of all admissions of persons with diabetes in the North American population. Of all lower-extremity amputations, 45 percent occur in people with diabetes; the age-adjusted rate of amputation is 11 times higher in those with diabetes than in people without diabetes. Appropriate management can prevent or heal diabetic foot ulcers, thereby greatly reducing the amputation rate. Prevention of amputations calls for the use of various measures, including regular foot examination and evaluation of amputation risk, patient education, early detection and treatment of diabetic foot ulcers and, if necessary, vascular surgery (Meltzer et al., 1998).

Podiatrists are specialists trained to treat all medical conditions of the lower extremity resulting from diseases, disorders and dysfunctions of the foot.

Currently Saskatchewan has 19 licensed podiatrists. Twelve of the podiatrists (63 percent) are salaried staff members of health districts. The other seven are in private practice.

The current ratio of podiatrists to total population averages 1:83,000 with a range of 1:32,000 to 1:115,000. In Ontario, the only province with a school of podiatry, the average ratio is 1:30,000.

Most health districts have waiting lists for podiatry services and the wait varies from a few months to one to two years. The clients are prioritized for service based on medical risk. People with diabetes are included in the high-risk category. The definition of medical risk is "any patients with pertinent systemic disease who have inadequate healing potential, increased susceptibility to infection and/or predisposition to necrosis and ulceration."

People with diabetes are seen most often for acute care rather than preventative care. The range of treatment is from preventative nail care for those with visual impairment or neuropathy to those requiring acute wound management.

Objective 5.3

Ensure timely access to quality foot care and prevention services for people with diabetes by specifically trained health professionals, including chiropodists and podiatrists throughout Saskatchewan by 2001.

Expanded Role for Diabetes Nurse Educators to Augment Diabetes Care and Treatment

Experienced diabetes nurse educators using the Saskatchewan Registered Nurses Association guidelines for Scope of Practice and Transfer of Medical Functions can assume an expanded role to provide continuing care and treatment for people with diabetes.

When Dr Hugh Tildsley, Division of Endocrinology, Department of Medicine, University of British Columbia presented to the Advisory Committee in December 1998, he reported on a comparison study of patients followed by endocrinologists and nurse clinicians. The patients followed by the nurse clinicians had better outcomes, including lower Hemoglobin A_1c levels (Thompson, 1999). This work is supported by similar research done in Florida (Aubert et al., 1998).

In Saskatchewan only two nurses have a Transfer of Medical Function with their health district's Medical Advisory Committee to permit them to work in an expanded role. Both nurses work in Saskatoon District Health and have the support of endocrinologists, internists and pediatricians in both skill development and ongoing support for this level of work.

There is a national certification examination process for diabetes educators. This is an expert exam. It would seem a reasonable first step to advanced practice.

Objective 5.4

Provide personnel resources, through the Canadian Diabetes Association to North and South Diabetes Educator Sections, to develop a template for policies and procedures for expanding the role of diabetes nurse educators for medication adjustment in accordance with the SRNA scope of practice guidelines by 2000.

Current Status of Diabetes Education in First Nations Communities

In response to the mailed survey and follow-up requests, twelve completed surveys were received. The results represent both Tribal Councils and individual Bands.

The First Nations who replied indicated the following:

- Most staff are described as having many responsibilities with few staff dedicated to work specifically on diabetes education, care and treatment;
- One Tribal Council (Prince Albert Grand Council) has a diabetes education team - nurse and dietitian. One Tribal Council has a dietitian and is providing continuing education for five Home Care nurses to become diabetes educators (Battlefords Tribal Council);
- 12 of 13 provide individual counselling and 11 of 13 provide group counselling for adults;
- 8 of 13 provide individual counselling for children/adolescents and 8 of 13 provide group counselling;
- 11 of 13 accept self-referrals;
- 25 percent identified a waiting list for services;
- Most say that they can meet the national standards for access to service within 48 hours;
- Major barriers to diabetes care and treatment identified were
  — fear and denial of the diagnosis of diabetes - "some clients would rather not know they have diabetes",
  — transportation to services,
  — cultural barriers, racism, level of comfort and the availability of culturally relevant materials;
- The interaction between the health districts and Tribal Council/Band to receive diabetes education services is variable;
- The data collection issues are similar to those found in the health districts.

The goals and objectives for this area are found in the Aboriginal Issues section.

Screening for Diabetes

Five of 30 health districts reported that they do "some" screening for diabetes. The majority of screening, outside of physicians' offices, is done at "Wellness Clinics". No health districts have organized screening programs to target those "at risk" for diabetes: for example, persons of Aboriginal ancestry, a family history of diabetes, those over age 45, the elderly.

The CPGs specifically state that mass screening of the entire population for Type 2 diabetes is not recommended. A fasting plasma glucose is recommended as the method for screening of those with risk factors.

GOAL 6

Ensure early detection of diabetes and appropriate follow-up care.

Objective 6.1

Promote appropriate and accurate screening for diabetes for all residents of Saskatchewan through the implementation of the *Clinical Practice Guidelines* (CPG) recommendations for screening and diagnosis of diabetes. The provincial diabetes coordinating body will monitor the implementation and use of the CPG on an ongoing basis.

PERSONAL HEALTH PRACTICES AND COPING SKILLS

Diabetes is not just a disease that affects the individual who has it. It is a disease, which has a profound impact on family members and on communities. The individual with diabetes plays the central role in ensuring that the disease is well managed, but family members, teachers, health professionals and friends play a key support role.

Included in Appendix 2 is a document entitled *Focus Group Results with People with Diabetes*. It summarizes the results of six focus group discussions held in four communities around the province with people who have diabetes. The purpose of the focus group sessions was to ask people who live with the disease for the perspectives on the availability and quality of diabetes education, care and treatment services in the province.

Control of diabetes is very dependent on personal practices from diet, physical activity to stress management and tobacco use.

Focus group members identified support through several sources: professionals who provided their initial and ongoing education, family and friends. The majority of people also identified a need for personal responsibility in diabetes care and management.

The Standards for Diabetes Education in Canada in the outcome standards, support the need for personal responsibility for self-care. In order for this outcome to occur, the process standards recommend a client-centred approach for assessment, planning and implementation of diabetes education.

GOAL 7

Individuals with diabetes, their families and support networks will have the necessary support to achieve self-care practices to the best of their ability.

Objective 7.1

Provide initial and ongoing education and follow-up for people with diabetes and their families via diabetes education programs and family physicians by 2004.

Objective 7.2

Provide information about community-based support services including the Canadian Diabetes Association, as part of diabetes education programming and through family physicians' offices by 2004.

EDUCATION

Education relates to many aspects of diabetes care. Health professionals who provide services to people with diabetes need to be knowledgeable. The public needs to be better informed about diabetes related to both early diagnosis and prevention of complications and also an understanding of the needs of those who are living daily with diabetes. The latter is crucial to ensuring that people with diabetes are able to live a healthy life and be productive members of their community.

Education for people with diabetes, both initial and ongoing, is addressed in other areas of the report.

Health Professional Education

All health professionals working with people with diabetes need a sound, up to date knowledge base about diabetes and its management. Nurses, dietitians, pharmacists and other health care providers must be current in both diabetes management and education methods. Whether primary or secondary diabetes educators, they require regular and comprehensive continuing education opportunities.

In order to meet the national standards for access to diabetes education services there is a strong reliance on secondary diabetes educators in most health districts. The health district, based on its resources and wait list, determines access to diabetes education services. National standards for certain types of clients for access to diabetes education services within 48 hours include: 1) a person with newly diagnosed Type 1 diabetes, 2) a person in crisis in diabetes management, 3) women who are pregnant with pre-existing diabetes and 4) those with marked hyper or hypoglycemia. National standards for access to education services within 1 to 2 weeks include women with GDM (gestational diabetes mellitus).

In most cases, it falls to the primary diabetes educators to provide continuing education for the secondary diabetes educators and other health professionals. Primary diabetes educators must, therefore, have the latest information on diabetes if they are to act as a resource to others. Primary educators also need adequate time to provide continuing professional education in addition to their other responsibilities.

The Canadian Diabetes Educator Certification Board (CDECB) provides a process for health professionals working in the area of diabetes to earn certification as a diabetes educator. Health professionals, who meet the eligibility criteria and pass a specialty exam, receive national certification as a Certified Diabetes Educator (CDE). Certification is voluntary and offers health professionals an opportunity to enhance their own professional development. The program recognizes experience and excellence in the field of diabetes education and exceeds minimal entry level requirements.

Physician Education:

In our survey of 100 randomly selected family physicians, 40 percent of those people who responded indicated that they had not attended a diabetes related continuing education event in the previous twelve months. And 44 percent indicated that they did not have a copy of the Canadian Diabetes Association's (CDA) 1993 *Clinical Practice Guidelines for the Management of Diabetes Mellitus*. The CDA's new *Clinical Practice Guidelines* were sent to all family physicians in October 1998, which should alleviate the problem.

The lack of sufficient numbers of endocrinologists directly affects the availability and quality of continuing medical education courses related to diabetes. Endocrinologists play a key role in physician training and continuing education in diabetes management.

GOAL 8

Ensure practicing health professionals in Saskatchewan who interact with people with diabetes are knowledgeable regarding diabetes and its management and implement the *Clinical Practice Guidelines* in their professional practice.

Objective 8.1

Establish, through the provincial diabetes coordinating body, a provincial network of at least one key physician per service area who will become a diabetes resource for that area by 2001.

These key physicians will provide support to both the diabetes educators in the local Diabetes Education Program and other physicians. The provincial coordinating body will establish criteria and responsibilities for key physicians and options for remuneration.

Objective 8.2

Establish a process for designated key physicians to attend an annual continuing education meeting and be part of provincial discussions regarding diabetes care and treatment by 2001.

The provincial diabetes coordinating body in partnership with Continuing Medical Education, industry and endocrinologists will coordinate the above.

Objective 8.3

Ensure collaboration between the proposed provincial diabetes coordinating body and the continuing education bodies of relevant health professions, e.g., nurses, pharmacists, dietitians, diabetes educators, practicing physicians etc. to provide regular high quality and accessible continuing education.

GOAL 9

Ensure accurate, current, practical curricula for students in the health sciences, who will provide direct care for people with diabetes.

Objective 9.1

Establish, through the proposed provincial diabetes coordinating body, links with health professional and related Universities, Colleges and Schools to offer assistance to programs in reviewing their diabetes-related curricula.

INCOME AND SOCIAL STATUS

Diabetes education centres and CDA get frequent calls from individuals and families who have a family member with diabetes who are not able to afford the cost of diabetes supplies. Some families have more than one person with diabetes. CDA research indicates that diabetes supplies cost an individual with diabetes who requires insulin, and who is testing three to four times a day and taking multiple injections, more than $2,000/year over and above the support provided through the Saskatchewan Prescription Drug Plan. This figure applies to someone using multiple insulin injections and testing blood sugar four to eight times per day.

Currently the additional cost is either being covered by private benefit plans or by the individual with diabetes. Even for middle income families finding $2,000 a year to pay for diabetes supplies can be difficult. People try to reduce costs by testing less frequently and by taking fewer insulin injections. This contradicts the findings of the DCCT, which showed conclusively that multiple injections and intensive therapy significantly reduce the incidence of serious complications. Syringes/pen needles are essential to administer insulin and are not presently included in the Drug Plan.

Governments and taxpayers face a clear choice. We can choose to provide people with diabetes with the financial support that they need to properly manage their diabetes and lead healthy and productive lives or we can pay much more down the road to treat the complications of diabetes. In contrast to the additional $2,000 a year it would take to cover the extra cost of a person's diabetic supplies, it costs about $55,000 per year to provide someone experiencing kidney failure with hemodialysis treatments.

While the Special Support Program of the Saskatchewan Prescription Drug Plan offers some assistance to lower income families and individuals, it is not sufficient. It is in the interests of everyone in Saskatchewan to provide people with diabetes the supports they need to manage their disease successfully so that we can avoid the longer-term human and social costs related to diabetes complications. This is an investment in the future.

Nutrition plays a key role in the management of diabetes. Currently, individuals on social assistance are eligible to receive additional funding to cover food costs associated with a diabetic diet. The funding is, however, conditional on the meal plan exceeding a certain energy (calorie) level. Also, a letter is required from a registered dietitian. Specific energy level diets are no longer typically used for diabetes management. Rather, the amount, type and distribution of carbohydrate, fat and protein are the focus.

GOAL 10

Reduce the impact of the human and financial costs of diabetes complications for people with diabetes so that they can afford optimal diabetes care.

Objective 10.1

Include insulin syringes and pen needles on the Saskatchewan Prescription Drug Plan Formulary by 2001.

Objective 10.2

Cover the cost of all diabetes supplies (including blood glucose meters and syringes), not subsidized through government or private plans, for all individuals with diabetes where the combined annual income for a family of four is $28,000 or less. (The 1998 low-income cut-off for a family of four is $28,000 - Statistics Canada.)

Objective 10.3

Review with the Department of Social Services the funding system for coverage of therapeutic diets. It is recommended that additional funding be provided for all diabetic diets, regardless of energy level.

References – see Appendix 3

DIABETES AND ABORIGINAL PEOPLES

- *Preamble*
- *Introduction*
- *Recommendations for Aboriginal Issues*
- *Conclusion*

Diabetes and Aboriginal Peoples

Preamble

In 1997, a Diabetes Working Group was organized as a joint initiative between First Nations (FN) and Medical Services Branch (MSB) to discuss issues related to diabetes in First Nation communities (on-reserve) in Saskatchewan. This group was invited to participate as one of the working groups within the Saskatchewan Advisory Committee on Diabetes. In order to fulfill the expectations of the Saskatchewan Advisory Committee on Diabetes the FN/MSB Diabetes Working Group invited participation from Aboriginal* and non-Aboriginal health care providers working "off-reserve" and in Metis communities. This group then became known as the Diabetes and Aboriginal Peoples Working Group (DAPWG).**

Stories have been collected from clients, focus group discussions and health care providers that augment the experiences of the working group members. We realize that this approach does not fall into any formal scientific methodology but is in keeping with the tradition of oral histories. Quotes from these stories appear throughout this document as text boxes. These quotes were selected to highlight areas of concern for Aboriginal peoples and are not intended to single out particular groups of professionals or organizations.

The purpose of the Aboriginal Issues section was not to duplicate the work of the other three working groups (Database Development and Epidemiology, Primary Prevention, and Education, Care and Treatment). Instead it was to bring forward issues of particular concern to Aboriginal peoples seeking care in a non-Aboriginal setting and/or for health care providers delivering care in Aboriginal communities.

* *Aboriginal: for the purpose of this report the term will be used to describe the following groups:*
1. FN people living on or off reserve
2. Non Status Indian people living on or off reserve
3. Metis people

** *It should be noted that this group does not see itself as speaking for either the First Nations community or the Metis community. Rather it is a group of health care providers and administrators who by virtue of their background, training and/or experience are knowledgeable in Aboriginal* health care issues (See Appendix 7 for the Working Group members and their affiliation). However, the chair was a representative of FSIN and the report has been reviewed and approved by representatives of the FSIN and of the Metis Health and Addictions Council of Saskatchewan.*

Introduction

> ***One FN healer told me stories of long ago seeing people with thick blood. He would treat them with his medicines until their blood became thinner. He now believes this was diabetes he was trying to treat. (Community health nurse)***

Diabetes was virtually unknown 50 years ago in Aboriginal peoples in Saskatchewan although there are anecdotal reports of healers treating people for "thick blood". [It is not known if "thick blood" was due to diabetes.] Diabetes is now one of the most common chronic illnesses experienced by Aboriginal peoples and the rates of diabetes and diabetic complications continue to increase. In one Saskatchewan study, over 50 percent of the First Nation people over the age of 60 met the diagnostic criteria for diabetes (Pylypchuk et al., 1998). Diabetes topped the list of serious community health problems identified by a subset of Saskatchewan respondents to the First Nations and Inuit Regional Health Survey (Kennedy, 1999).

Although epidemiological data about the extent of diabetes in Saskatchewan Aboriginal peoples is limited, the data presented in this report and other data indicate that the age-sex adjusted prevalence rates for First Nations people are approximately three times greater than the non-First Nations rate. The age-standardized rates for Metis communities in northern Saskatchewan are very similar to First Nations' rates.

An unpublished report prepared for Saskatoon Tribal Council indicated that 15 percent of band members described themselves as diabetics and 47 percent of the 250 respondents indicated that diabetes was the most serious health problem in their community (Crozier, 1992). In another prevalence study of all Saskatchewan reserves (1980-1990) the crude prevalence rate of diabetes for all age groups showed an increase from 1.4 percent to three percent (Pioro et al., 1996). In a study evaluating the risk of diabetes in 601 adults (30 percent of the on reserve population) living in the Battlefords Tribal Council First Nations communities, the prevalence of diabetes was 22 percent. In ages 19-39, the rate was eight percent and it increased to 51 percent in those over the age of 60 (Pylypchuk et al., 1998).

The human and economic cost of the current diabetes epidemic is a serious concern within Aboriginal communities - whether they be First Nations people living on reserve, First Nations people living off reserve in urban or rural centres or Metis peoples living in remote and urban centres. The large distances between communities and remoteness from larger centres pose unique problems for some remote communities. Urban centres also have unique challenges to provide service to Aboriginal peoples. Over 80 percent of the respondents to the First Nations and Inuit Regional Health Surveys indicated that diabetic education/awareness health services to First Nations were in need of improvement (Wien & McIntyre, 1999). Resources are needed immediately if we are to change the future and reduce the incidence of diabetes among Aboriginal peoples.

> *There seemed to be an outbreak (in 1984), many people whom I knew, relatives and friends who were also being diagnosed as diabetic (my mom for example) at about the same time. What I did notice, was that people who did not quit drinking died of heart attacks. I also noticed people losing limbs, feet. (FN client)*

The working group has determined, through the testimonies of Aboriginal peoples affected by diabetes, the experiences of Aboriginal health professionals and leaders as well as other health professionals, that significant gaps in services and barriers to accessing services exist in Saskatchewan.

> *Diabetes, tuberculosis and cancer has hit my family hard in the past years. My mom and dad have diabetes. My wife also has diabetes. (Metis client)*

Some of the challenges to developing an effective strategy to address prevention, care and support issues and services for Aboriginal peoples include language, culture, lack of understanding of the health and social conditions facing Aboriginal peoples, education, geography, and food security ***. Addressing these challenges is complicated by jurisdictional issues.

> *I think a lot of it has to do with the change in diets that we had. In food, we began to buy more prepared food. I guess if I had learned to read labels, I would have known about added sugars, salts and fats. (FN client)*

The Diabetes and Aboriginal Peoples Working Group has identified a number of issues surrounding the care of people with diabetes, and assisting people to manage their diabetes more effectively.

Enhanced, wholistic**** diabetes education programs are needed to better meet the needs of Aboriginal people.

> *I was struggling the last year with diabetes, what really shook me was the DREAM (team) when they found traces of protein in my urine. I [my blood sugar] used to be 14 and now I am down to 9. My goal is to be at 7. (FN client)*

*** *Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. (UN Food and Agriculture Organization, World Food Summit, 1996)*

**** *In Aboriginal societies there was no word, term or expression for "health" as it is understood in Western society (Brady et al., 1997). The term wholistic embraces a "whole of life" view including physical, mental, emotional and spiritual realms, therefore the Working Group prefers to use "wholistic" rather than "holistic".*

More assistance is needed to help people monitor and maintain lower levels of sugar in their blood for the prevention of complications.

> *The doctor tests my blood sugar - 14 and he says, "OK". Then it tests 6 and he says, "OK" . Doctors that let everything go on for so long are not good partners. (FN client)*

Health Care providers, including physicians, need to become more understanding of the various cultural and social issues facing Aboriginal peoples in their care.

> *I have gone to the doctor and found that she supports me. (FN client)*

Recommendations for Aboriginal Issues

Education, Care and Support Issues

An effective strategy to control diabetes in Aboriginal peoples in Saskatchewan must address issues related to the health service delivery system. Health care providers face difficulties working their way through the complex administrative health and benefit programs of the provincial, federal, First Nation and health district health care systems. These systems sometimes seem like mine fields of bureaucracy to clients and providers.

> *It makes no sense to me why we continue to focus on taking the patient, at great cost, to distant health services instead of working towards optimizing services in Aboriginal communities. (Medical social worker)*

> *The hardest part was the three and a half-hour trip to Saskatoon each week. (FN client)*

An overriding principle which should guide the development and implementation of programs and services which will be accessed by Aboriginal peoples is to ensure that they incorporate traditional learning styles. This means using educational activities that favor hands-on experience and "showing rather than just telling why".

My doctor informed me that I was starting to have slight kidney damage. I sneak in here (clinic) once in a while and take a pamphlet or at the hospital. My wife did attend a few workshops and brings the information home and I read up on it. (Metis client)

GOAL 1

Culturally appropriate, client-centered diabetes education, care and support services will be available to all Aboriginal peoples in Saskatchewan.

Action 1.1

Develop mechanisms that encourage collaboration among local diabetes health teams, physicians and other health care providers to ensure the provision of high quality diabetes services to Aboriginal peoples.

Action 1.2

Ensure accessibility to a diabetes health team (dietitian and diabetes nurse educator) within their community, or as close to their community as possible.

On diagnosis, I had a fasting blood sugar done and was sent to the Diabetes Education Centre. I saw a dietitian. She explained a chart about what I could eat, and the symbols. After that, I had no other follow-up. (FN client)

Action 1.3

The proposed provincial diabetes coordinating body, in partnership with Aboriginal communities and organizations will develop a process to identify the gaps in services faced by Aboriginal peoples affected by diabetes.

Action 1.4

The proposed provincial diabetes coordinating body will initiate discussions with Saskatchewan Health, Health Canada, Tribal Council, representatives of the Metis Nation, independent First Nations and health districts, to ensure appropriate funding and resources for services to Aboriginal peoples affected by diabetes regardless of place of residence.

Action 1.5

Ensure that the proposed provincial diabetes coordinating body has qualified staff designated to work in Aboriginal diabetes. This should assure that providers of diabetes education have current knowledge, as well as skills, and are aware of the cultural and social issues affecting Aboriginal peoples with diabetes.

That cardiac rehabilitation program that I attended really helped me. What made it even more effective was I had to see it with my own eyes that a change in lifestyle can bring about such dramatic results. To become more aware of my own body and its inner workings. (FN client)

I am really monitoring my blood now, whereas before I would only do it once a month. I am very careful with my diet. I do cheat with my diet, having a chocolate once in a while. (Metis client)

Action 1.6

Saskatchewan health districts and Aboriginal health organizations need to work in partnership with local community health care providers to improve accessibility to comprehensive diabetes services (education, care, treatment and support) so that people affected by diabetes can achieve and maintain optimal diabetes control.

I read pamphlets. I have friends that have diabetes and they fed me some information. But as far as the information about diabetes, when I was told I had it, there wasn't very much only that it could be damaging to your kidneys. (Metis client)

Prevention

In our opinion, which is supported by the accounts from clients and health care providers in the communities, the rapid rise in the incidence of Type 2 diabetes in Aboriginal peoples is contributing to a fatalistic attitude about diabetes among Aboriginal peoples. Efforts to implement early diagnosis and primary prevention strategies will have to address this. Almost fifty percent of Aboriginal peoples live off reserve and this will present a challenge for all health care providers to work together to develop and implement innovative and effective strategies for prevention.

My Grandmother, my father, aunts and cousin have diabetes. My family thinks we will all get it. I don't want to get it. I am being active by exercising, lifting weights and also learning about eating right. I'm doing all I can. I don't want to get diabetes. (FN client)

GOAL 2

Effective, wholistic, community-based prevention strategies be developed to reduce the incidence of diabetes among Aboriginal peoples in Saskatchewan and to prevent the complications of diabetes.

> *People need information on diabetes prevention, control and management. Reserve members need to know what can happen if there is not good diabetic control; people who have developed complications could become part of the teaching program. (FN client)*

Action 2.1

Saskatchewan Health and health districts should work with Aboriginal communities and agencies throughout the province to ensure that:

- The goals and objectives addressing prevention in this document incorporate traditional Aboriginal approaches;
- The strategies are culturally appropriate and adaptable to meet the needs of all Aboriginal peoples regardless of their place of residence; and
- These strategies be throughout the provincial health care system and are flexible to incorporate Aboriginal approaches, which may be different in different parts of the province.

> *I also made peace with myself, instead of fighting it and living in denial, that there was anything wrong with me, that I've had to accept that this will be with me for the rest of my life. I look forward now to the future, to each day, that it's a little bonus for me, and I know that I can live a normal life, following some simple rules, diet and exercise. (FN client)*

Action 2.2

The program activities and approaches of Saskatchewan Health, health districts and the proposed Saskatchewan diabetes coordinating body should support Aboriginal school and community initiatives, which promote healthy lifestyles including traditional practices that encourage active living, healthy eating and smoking cessation.

> *I think that my own personal wellness has helped to slow down my diabetes. Certainly because I don't drink (alcohol), because I try to follow a diet. (FN client)*

Why is it that we teach healthy eating but when we go to the store, "junk food" and pop are available at a lower price than fruit and vegetables? Yet, liquor is the same price in northern liquor board stores as in the south. (Northern healthcare provider)

Action 2.3

Work to ensure that northern and remote communities have equitable access to quality, low cost foods (including traditional food sources) to address food security issues. This could be done in partnership with other provincial and federal government departments (i.e. Agriculture and Food, Transport Canada, Liquor and Gaming Authority, Canada Post, Social Services, etc.).

I stay healthy with a lot of exercise; I also like to eat traditional foods even though I don't get much of it. Like ducks, rabbits, moose meat, fish. It's very healthy for you. (Metis client)

Action 2.4

Support Aboriginal media organizations to develop mass media products which focus on positive lifestyle and healthy eating using appropriate language with translation when required.

Videos by First Nations in different languages would be useful. Some written information would help those that can read. I would like people in each community to make a video about diabetes. When you watch a video and you don't know the people in it, you can't relate to that. (FN client)

GOAL 3

Aboriginal peoples with diabetes will be diagnosed at the earliest stage possible.

I wonder how long I had the disease before it was discovered? (FN client)

I always had symptoms but didn't know them at the time - always thirsty, went to bathroom lots. That felt normal and still feels normal. I might have had it since I was a teen. (FN client)

Action 3.1

Explore all opportunities for screening for Aboriginal peoples. Aboriginal Health Authorities and health districts will implement the *1998 Clinical Practice Guidelines for the Management of Diabetes in Canada* (Meltzer et al., 1998), and in particular ensure that the guidelines for screening Aboriginal adults are followed.

I took my blood glucose monitor to a class presentation and checked nine of ten students (two students and myself were already diagnosed with diabetes). Of those nine, two had high blood sugar, and went to the doctor after and were confirmed with diabetes. So five of twelve people in our class had diabetes. (FN client)

Conclusion

Why is diabetes so prevalent in Aboriginal populations? Why has there been an increase compared to half a century ago? The serious consequences of diabetes make it clear that prevention is key to reducing the magnitude and extent of the problem. The issues and recommendations identified in this report, by the other working groups, also apply to Aboriginal people. The role of the DAPWG was to identify challenges specific to Aboriginal people, which could affect the delivery of a provincial diabetes strategy. The current system for health education, care, treatment and support services in Saskatchewan can lead to both duplication and gaps in service, as well as barriers to accessing existing services. The working group wishes to emphasize the need to view diabetes in the context of the profound social changes experienced by Aboriginal communities. It recognizes the importance of community involvement in developing and implementing treatment and education programs that are compatible with, and incorporate, traditional values and customs.

References - See Appendix 3

CONCLUSION

The toll that diabetes is taking in human and economic terms is truly a tragedy.

This report provides recommendations for a comprehensive provincial strategy to deal with diabetes. It provides a framework for models of diabetes surveillance, prevention, education, care, treatment and support for all Saskatchewan residents.

The good news is that there is much that can be done to prevent the development of diabetes in the first place, to detect it as early as possible and to treat the disease effectively and prevent or reduce long-term complications of diabetes and related conditions

A commitment from all interested citizens, organizations, the health sector and governments will be required to implement a comprehensive strategy. The time to begin this work together is now.

APPENDICES

- ***Primary Prevention of Type 2 Diabetes: Analysis of the Issues***
- ***Diabetes Education Services***
- ***References***
- ***Glossary***
- ***Terms of References***
- ***Members of the Advisory Committee***
- ***Working Group Members***

DIABETES 2000
REPORT OF THE
SASKATCHEWAN ADVISORY COMMITTEE ON DIABETES

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APPENDIX 1

Primary Prevention of Type 2 Diabetes: Analysis of the Issues in Reducing the Risks A Literature Review

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Primary Prevention of Type 2 Diabetes: Analysis of the Issues in Reducing the Risks. A Literature Review

1. INTRODUCTION

Diabetes is a complex metabolic disorder. Type 1 diabetes, previously called insulin dependent or juvenile diabetes, is usually first diagnosed in childhood or adolescence. Type 2 diabetes, previously called non-insulin dependent or maturity onset diabetes, normally first occurs among adults although it can occur at younger ages. Gestational diabetes occurs in pregnancy and typically disappears when the pregnancy is complete although it may reoccur later in life. Over 90 percent of people with diabetes have Type 2 diabetes. There are more opportunities to prevent Type 2 diabetes than other types. There are no effective means of reducing the risk of Type 1 diabetes at present.

1.1 What Causes Type 2 Diabetes? How Can Risk Be Reduced?

Although the causes of Type 2 diabetes are not fully understood, it is clear that at least three factors are important: (1) a genetic predisposition, (2) a defect in pancreatic ß-cell function and (3) a decrease in the action of insulin in insulin-sensitive tissues (Tuomilehto, Knowler & Zimmet, 1992). Conditions associated with the development of insulin resistance significantly increase the risk of diabetes in genetically susceptible individuals (Tuomilehto et al., 1992). Insulin resistance and high insulin levels in the blood may have a critical role in the harmful effects of the range of metabolic abnormalities that occur frequently in people with diabetes - obesity, hyperlipidemia and hypertension (Tuomilehto et al., 1992). Interventions that prevent or reverse insulin resistance through alterations in lifestyle, such as increased physical activity and the prevention of obesity, may have a substantial protective effect (Tuomilehto et al., 1992).

1.2 Is Type 2 Diabetes Preventable? Yes!

Although Type 2 diabetes clusters in families, it results from an interaction between genetic susceptibility and certain precipitating factors (Tuomilehto et al., 1992). Despite the important role of genetic factors, the risk of developing diabetes can be reduced significantly (Manson & Spelsberg, 1994). Information from studies of migrating populations, such as the Japanese and Chinese who moved to Hawaii or the mainland of the United States, support a powerful impact of modern lifestyles on the risk of developing Type 2 diabetes in populations traditionally free from this disease (Manson & Spelsberg, 1994). The rates of diabetes among First Nations people in Saskatchewan have risen dramatically in the last 50 years even though genetic makeup would be relatively stable over that time period (Pioro, Dyck, & Gillis, 1996).

Epidemiological research has shown four major modifiable risk factors for Type 2 diabetes: physical activity, obesity, body fat distribution and dietary factors (Manson & Spelsberg, 1994). In fact, the strongest and most widely accepted environmental risk factors for Type 2 diabetes are those which have

been described as the inter-related triad of obesity, reduced physical activity and inappropriate diet (Daniel & Gamble, 1995).

Type 2 diabetes can be prevented or its onset delayed.

There appears to be little opportunity for prevention of Type 1 diabetes at present.

1.3 What is Primary Prevention?

The focus of this report is on reducing the risk of developing Type 2 diabetes. This is also called primary prevention of diabetes.

Primary prevention includes activities that are aimed at preventing diabetes from occurring in susceptible people or populations through modifications to the environment and changing behavioural risk factors (World Health Organization, 1994). This covers any changes undertaken prior to development of clinical diabetes. There are two broad approaches to primary prevention of diabetes. One is the population approach that targets risk factors in a whole population or group. The second is targeted towards reducing the risk factors for individuals.

Secondary prevention covers methods such as screening to detect diabetes as early as possible in order to reverse or halt side effects (World Health Organization, 1994). Although the focus of this report is on primary prevention, the risk factors identified may be considered in development of a screening program.

Tertiary prevention is any measure undertaken to prevent complications and disability due to diabetes among people who already have the disease (World Health Organization, 1994).

2. REVIEW OF THE LITERATURE ABOUT RISK FACTORS FOR DIABETES

There are both individual and environmental risk factors for diabetes. A comprehensive review of risk of diabetes goes beyond counting the number of people who are overweight or don't engage in regular physical activity to include the underlying factors affecting people's health. In this section we will first summarize the broad determinants of health and then go on to review risks that are specific for diabetes.

2.1 What Determines Health and Illness?

Powerful economic and social forces, combined with individual practices and abilities, influence what opportunities people have and what choices they make (Joint Steering Committee, 1996). A comprehensive plan to prevent diabetes includes factors affecting the overall health of a community, not just those affecting any one individual. It is also essential to note that many jurisdictions outside the health field play key roles.

> *Strategies for Health: Investing in the Health of Canadians* (Minister of Supply and Services Canada, 1994) identifies the health determinants as:

1. **Income and social status**. It isn't the amount of wealth but its distribution that makes the difference to health. Social status also affects health by determining how much control people have over circumstances such as housing, nutrition and physical activity.
2. **Social support networks**. Support from families, friends and communities is vital to help people cope with difficult situations and maintain a sense of control over their lives.
3. **Education**. Education provides knowledge and skills for daily living and increases opportunities for employment.
4. **Employment and working conditions**. Meaningful work with economic stability and a healthy work environment are linked to good health.
5. **Physical environment.** Air and water quality, housing and community safety have a major impact on health. For example, if you don't feel safe in your neighbourhood, you aren't likely to take an evening walk.
6. **Biology and genetics**. Some people have a genetic predisposition to certain illnesses. Diabetes is one example.
7. **Personal health practices and coping skills**. Effective coping skills enable people to solve problems and make choices that enhance their health.
8. **Healthy child development**. Prenatal and early childhood experiences have a lifelong effect on health.
9. **Health services**. Preventive and primary care services such as immunization improve the overall health of the population. (The focus here is the health of the population rather than health of individuals).

Analysis of the underlying factors that determine health leads one beyond counting the number of cases of an illness or injury towards creating practical tools for planning and program development. This greatly increases the effectiveness of the resulting services.

2.2 What are the Specific Risk Factors of Type 2 Diabetes?

The determinants of health and population health form the framework for addressing health problems such as diabetes. The modifiable risk factors for diabetes include physical inactivity, obesity and inappropriate diets. These will be discussed in some detail. The non-modifiable risk factors include age over 40, a family history of diabetes, previous gestational diabetes and previous impaired glucose tolerance. The non-modifiable risk factors are useful for establishing screening criteria but will not be covered in this report because primary prevention interventions are unable to alter them.

2.2.1 PHYSICAL INACTIVITY AS A RISK FACTOR FOR TYPE 2 DIABETES MELLITUS

Physical activity, even without weight loss, can increase insulin sensitivity and improve glucose tolerance (Manson et al., 1991; 1992) among non-diabetic individuals, as well as among those with impaired glucose tolerance or overt diabetes (Spelsberg & Manson, 1995). However, individuals with mild to moderate diabetes [(fasting plasma glucose less than 200 mg/100 ml (11.1 m M)] appear to benefit more from physical activity than do those with more severe hyperglycemia (Spelsberg & Manson, 1995). Physical activity is associated with lower plasma insulin concentrations and improved insulin sensitivity (Daniel & Gamble, 1995; Spelsberg & Manson, 1995; Tuomilehto et al., 1992).

Further studies demonstrated that plasma insulin concentrations decreased in obese, insulin-resistant subjects who participated in physical-activity programs, even when there was no change in body composition or oral glucose tolerance (Tuomilehto et al., 1992). Subsequently, numerous investigators have shown that both regular physical activity and the actual activity of exercise itself increase insulin sensitivity, whereas both loss of conditioning and physical inactivity are associated with the development of insulin resistance (Tuomilehto et al., 1992). However, the positive benefits of activity appear to be of limited duration so that regular exercise must be maintained for maximum benefit in the management of diabetes (Spelsberg & Manson, 1995).

2.2.1.1 Evidence of Physical Inactivity as a Risk Factor for Type 2 Diabetes

Indirect evidence that physical inactivity is a risk factor for Type 2 diabetes is provided by descriptive comparisons of the prevalence of Type 2 diabetes in active rural and inactive urban populations (Manson et al., 1991; 1992). Support for the benefits of physical activity also comes from cross-sectional studies, which showed the prevalence of diabetes or abnormal glucose tolerance to be greater among sedentary individuals than among their more active counterparts, independent of age and BMI (Manson et al., 1992; Manson et al., 1991). The relative risk estimates in cross-sectional studies comparing the most sedentary with the most active persons range from no association to a 2.7-fold increased risk of Type 2 diabetes among the most sedentary (Spelsberg & Manson, 1995). In a retrospective study of a cohort of women, a 3.4-fold increased risk of Type 2 diabetes was found among those who did not participate in vigorous athletic activities in their college years (Spelsberg & Manson, 1995).

2.2.1.2 Prospective Studies

Six large prospective studies have found exercise to be protective (Tuomilehto et al., 1992). The protective effect of physical activity was independent of other risk factors including parental history of diabetes, older age, a history of hypertension, the presence of obesity (as measured by BMI), and low levels of leisure-time physical activity. Furthermore, whether they lost weight or not, physical activity was found to be even more protective for obese individuals compared with those at lower weights (Manson et al., 1992).

One possible mechanism to explain the effect of physical activity on diabetes is that GLUT4, a glucose transport protein in adipose and muscle tissues, is affected by exercise (Bergman, 1997; Garvey, 1994). Levels increase significantly with physical activity and drop again rapidly when activity stops for several days (Vukovich et al., 1996). It should be emphasized that while this appears to be a promising explanation, the evidence is not conclusive.

2.2.1.3 Effect of physical activity

The hypothesis that physical inactivity is an important determinant of Type 2 diabetes and that regular moderate or vigorous exercise may reduce the incidence of Type 2 diabetes has been supported in all the prospective studies and most of the cross-sectional investigations (Spelsberg & Manson, 1995). In fact, according to the estimates derived from the prospective studies, the potential reduction in the risk of Type 2 diabetes associated with regular moderate or vigorous exercise, as compared with a sedentary lifestyle, is between 30 and 50 percent for individuals (Spelsberg & Manson, 1995).

The strength and the importance of the relationship between physical activity and Type 2 diabetes are likely to vary across the spectrum of glucose tolerance from normal through impaired to overt diabetes (King & Kriska, 1992). Although the primary abnormality in Type 2 diabetes is still up for debate, it is suggested that insulin resistance appears to predominate early in the course of glucose tolerance, with insulin deficiency developing later (King & Kriska, 1992). Metabolic studies have demonstrated that the major effect of physical activity is in terms of insulin sensitivity/resistance (King & Kriska, 1992).

Therefore, physical activity may have the greatest influence on the progression of the disease in the early stages of intolerance when insulin resistance is the major cause for the abnormal glucose response (King & Kriska, 1992). Thus, one might expect that physical activity would be more effective in preventing deterioration from normal tolerance than in reversing existing intolerance (King & Kriska, 1992). Furthermore, studies of non-diabetic individuals suggest that the addition of physical activity to diet therapy will facilitate and assist in the maintenance of weight loss, particularly of adipose tissue (Manson et al., 1991).

Intervention studies suggest that sustaining modification of lifestyle factors, including dietary changes and increase in physical activity, are feasible and may help to prevent, or at least postpone, the onset of Type 2 diabetes (Spelsberg & Manson, 1995).

Pan et al., (1997) conducted a large prospective intervention study of people with impaired glucose tolerance. Groups were randomized by clinic to receive diet, exercise, or both. Diet and exercise changes were not extreme. Over a six year period, the cumulative incidence of Type 2 diabetes was 67.7 percent for controls, 41.1 percent for those who exercised, 43.8 percent for the diet group, and 46.0 percent for those in the diet plus exercise group. After adjusting for weight and age, the overall reduction in the incidence of Type 2 diabetes was 33 percent in the diet-only group, 47 percent in the exercise-only group, and 38 percent in the diet-plus-exercise group (Pan et al., 1997). The caution necessary with this study is that it was conducted in China where the diet and activity patterns may be so different from those in Canada that the changes used in the study might not produce the same effects here. On the other hand, research in other countries has produced similar results although sample sizes were smaller (Eriksson & Lindgarde, 1991).

2.2.1.4. How much physical activity is necessary to reduce the risk of developing Type 2 diabetes?

The incidence of Type 2 diabetes was inversely related to the frequency of vigorous exercise (Manson et al., 1992). One way to assess the intensity of physical activity is the MET (millilitres of oxygen used per kilogram per minute). Physical activities of moderate intensities (≥5.5 METs) that were undertaken for more than a 40-minute duration each week and higher levels of cardiorespiratory fitness protected against the development of Type 2 diabetes in Finnish men (Lynch et al., 1996). (The MET is the ratio of metabolic rate during exercise to metabolic rate at rest. For example, someone who reported walking with some breathlessness and sweating might have an intensity score of 6.0 MET.) In this study, physical activity with an intensity lower than 5.5 METs, regardless of the duration, did not confer a reduction in the risk of Type 2 diabetes (Lynch et al., 1996). In addition, the protective effect of

moderately intense physical activities was even more pronounced in a group that was considered at a high risk of Type 2 diabetes (Lynch et al., 1996).

Although vigorous physical activity may be ideal for reduction of some risks, there is now general agreement that less intense physical activity over longer periods of time are highly beneficial. The National Heart, Lung and Blood Institute funded a study that found that sedentary people who were moderately overweight significantly improved their fitness and reduced blood pressure when they gradually added more physical activity to their daily routines or participated in structured activities at a fitness centre (Dunn et al., 1999).

For general fitness, *Canada's Physical Activity Guide* recommends 60 minutes per day of light activities such as slow walking or easy gardening, or 30 to 60 minutes of moderate activity such as brisk walking, biking or swimming or 20 to 30 minutes of vigorous activity such as aerobics or fast dancing (Health Canada, 1999). Those who engage in more vigorous activities may not need to do them as frequently. (Flexibility and strength activities are also recommended but have less direct bearing on diabetes prevention.)

2.2.1.5. When should physical activity begin to prevent Type 2 diabetes?

Since it has been suggested that a long exposure to environmental factors is needed before the state of overt Type 2 diabetes is reached (Tuomilehto et al., 1992), it is essential to prevent these factors at the earliest stage possible and to continue these efforts in prevention throughout life. Telama et al., (1997) reports that childhood is usually considered to be the best age for socialization into physical activity, and attitudes and skills acquired in childhood are regarded as important for habitual activity in adulthood. Participating in sport club activities is interesting for the reason that among children and adolescents, it represents the most intensive and regular type of physical exercise outside school. This can be considered to have an impact on later physical activity. The number of people who participate regularly in any type of physical activity decreases in puberty and thereafter. At the same time, the proportion of those who participate in intensive physical activity increases. This means that young people are divided more and more into those who are rather sedentary and those who are active in an intensive way. Physical activity before and during puberty increases the probability of a physically active way of life in early adulthood. It may be that the experience acquired and skills learned in childhood physical activities make it easier to pick up physical exercise and adopt new forms of physical activity in middle age. A new finding in the study by Telama et al., (1997) was that participation in organized sports for at least three years during adolescence predicted increased physical activity in young adulthood.

2.2.2 OBESITY AND FAT DISTRIBUTION IN THE PRIMARY PREVENTION OF DIABETES

Obesity results from a combination of genetic, environmental, emotional, cultural and socio-economic factors (Bidlack, 1996). Even modest weight loss can improve metabolic abnormalities including Type 2 diabetes but existing methods of weight loss treatment are largely ineffective, perhaps because the environment encourages obesity.

2.2.2.1 Are obesity and central obesity independent risk factors?

Tuomilehto et al., prepared and extensive review of the literature related to diabetes and risk factors such as obesity (Tuomilehto et al., 1992). Obesity was identified as a risk factor for Type 2 diabetes in a number of cross-sectional and longitudinal studies. High body mass index (BMI) (weight in kilograms divided by height in meters squared) is associated with increased risk in both genders and all ethnic groups. Fat in the central part of the body (around the waist) has been found to be a risk in most groups. In some studies, central body or abdominal obesity was found to be a risk factor independent of BMI but this is not consistent for both genders and all races studied. While the mechanisms are not known at this time, it is possible that insulin resistance may be affected by the fat in the central part of the body and overall body mass may affect insulin secretion. Fat in the abdomen is less sensitive than fat under the skin to insulin (Manson & Spelsberg, 1994).

All forms of obesity produce elevated fasting plasma insulin and exaggerated insulin response to oral glucose (Kopelman, 1997). The greater the upper-body obesity, the larger the glucose and insulin response to oral glucose, indicating that it is an independent risk factor.

The Canadian Heart Health Studies provide the most current weight profile of a large sample of Canadians (Macdonald et al., 1997; Reeder et al., 1992). The prevalence of overweight (BMI $\geq$ 27) was higher among men (35 percent) than women (27 percent). The rate of abdominal obesity was higher among men as well. People with lower levels of education had a higher prevalence of obesity and this appeared even at young ages. Self-reported rates of diabetes in the studies provide reliable but low estimates of the number of people in the survey with diabetes (Reeder et al., 1992). (Many people do not know they have diabetes.) The prevalence of diabetes increased with degree of obesity and was greater among those with a high waist to hip ratio.

The Manitoba Hearth Health Survey showed that both BMI and waist to hip ratio are independent predictors of fasting plasma glucose but BMI is the stronger predictor (Young & Gelskey, 1995). In a study of adult Indians in six remote communities in northern Ontario and Manitoba, high BMI (above 26) was associated with higher fasting plasma glucose and glycosylated hemoglobin while amount of central fat deposits was associated only with glycosylated hemoglobin (Young, Sevenhuysen, Ling, & Moffatt, 1990).

It should be pointed out that there are some ethnic differences observed in the association between glucose tolerance and fat patterning. For example, Young (1996) studying a northern Inuit population found that central obesity was not associated with higher levels of fasting glucose. This is in contrast to earlier studies of the general population of Manitoba. They suggest that the unique Inuit diet based on protein and fat may have produced an adaptation which led to a lower than expected response to carbohydrate in the diet. Insulin resistance includes both glucose disposal and lipid oxidation. It is proposed that among the Inuit, unlike other populations, increased body mass has no effect on fasting glucose. It is also possible that the excessive central fat identified in the Inuit by a high waist to hip ratio is a measurement of subcutaneous fat needed for survival rather than intra-abdominal fat.

2.2.2.2 Controlling body weight as a strategy for reducing the risk of Type 2 diabetes

The study by Pan et al (1997) shows that dietary interventions aimed at changing diet and/or increasing physical activity had positive benefits for people with impaired glucose tolerance. You could not, however, conclude from the data that the beneficial effect was due to weight loss. All the people who developed diabetes lost weight (average loss of 0.87 kg.) whether they were part of the control or a test group. Of the people who did not develop diabetes, the control group gained 0.27 kg, the diet group gained 0.93 kg and the exercise group gained 0.71 kg. Only the exercise plus diet group lost weight (1.77 kg.), but the exercise plus diet group did not have as good outcomes as the diet alone or exercise alone groups. The beneficial effects of the treatments were observed for both lean and overweight participants. People who began the study at higher BMIs were at increased risk of developing diabetes.

Ford et al., (1997) looked at weight gain over a ten year period as a risk factor for diabetes among a national sample of 14,407 people who were over age 25 at the beginning of the study in 1971-75 (National Health and Nutrition Examination Survey, NHANES I). They estimated that the population attributable risk for weight increases of five kilograms was 27 percent. For individuals, the risk of diabetes increases by 4.5 percent for every kilogram gained. The authors acknowledge that there are some limitations in the data but the risk is consistent with results of other studies. The three most useful predictors of weight gain, according to Bouchard (1991), are; 1) whether overfeeding causes gains in fat or fat-free tissues, 2) low resting metabolic rate and 3) low levels of lipid oxidation relative to carbohydrate oxidation.

Kopelman (1997) reviewed methods of selectively reducing intra-abdominal fat but concluded that the only safe way was to reduce total body fat, a proportion of which is intra-abdominal. Surgical removal, gastric bypass, growth hormone and testosterone do make a difference but are not safe methods of weight loss for the general public. Exercise alone, or in combination with low calorie diets, can have beneficial effects on body fat but it is a generalized loss from the whole body.

2.2.2.3 What causes obesity?

Body weight is the result of a wide range of factors including genetics, behaviour, habits of family and friends, physical activity, diet and social forces such as socio-economic status and education level (Health and Welfare Canada, 1988). It is recognized that there are inherited differences in susceptibility to obesity under given behavioural and lifestyle conditions (Bouchard; 1991, Garrow, 1990; Sohar,

Scapa, & Ravid, 1973). Genetic heritability accounts for 25-30 percent of obesity (Lau, 1999). There are also inherited differences in where fat accumulates in the body. American studies show that overweight is 50 percent greater among women of low-income status than women above the poverty line are (Bidlack, 1996).

An American study of television viewing and fast food consumption among adults showed that both were positively correlated with energy intake and BMI in women but not men (Jeffrey & French, 1998). Amount of television viewing predicted weight gain among high-income women. In a study of the NHANES III data, it was found that children who watched four or more hours of television per week had significantly greater BMIs and body fat levels than those who watched two or less hours (Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998). It is possible that socio-economic status was a confounder in this study because ethnic minorities showed definite differences in television watching and vigorous physical activity.

2.2.2.4 Controlling body weight

Unfortunately, the ongoing popularity of weight loss programs, products and aids is a testament to the relative ineffectiveness of existing methods of weight control. To date, programs to help overweight adults to achieve and maintain a desirable weight have been largely unsuccessful (Bidlack, 1996; Coulston, 1998). The biggest challenge is to maintain reduced weight over several years (Garrow, 1990). Garrow proposes that the difficulty for people who have lost weight is that they don't notice that weight is being regained.

There are many reports of successful weight loss and maintenance for a year or more after a program of exercise and/or diet was instituted (Andersen et al., 1999, Ornish et al., 1998). But there is no convincing evidence that most weight loss programs are particularly effective in the long term or practical for large-scale implementation. Americans spend an estimated $32 billion on weight products and programs each year (Bidlack, 1996) but benefits are minimal.

Since permanent weight loss is so difficult, support for primary prevention of unhealthy weight gain is imperative (Ottley, 1997). The prediction of adult obesity from childhood and adolescent fatness is only moderate but it is consistent (Power, Lake, & Cole, 1997). Some conclude that population-based approaches to obesity rather than targeted approaches to children are most likely to be beneficial. Others would argue that obesity prevention has a place among children and adolescents while recognizing that it is only part of an environmental-based approach (Hill & Trowbridge, 1998, Jackson, 1991). To extend our view of the underlying associations with obesity, it is useful to mention a study of 2,913 American children ages zero to eight at the beginning of the study (Strauss & Knight, 1999). All children were of normal weight at the beginning of the study. They were followed over a six-year period. Children with obese mothers, low family incomes and lower cognitive stimulation had significantly elevated risk of developing obesity, independent of other demographic and socio-economic factors.

A special issue of Pediatrics reviews the causes and health consequences of obesity among children (Hill & Trowbridge, 1998). National surveys show significant increases in obesity among children and adults, indicating that fundamental shifts in diet and/or physical activity seem to be occurring in the United States. The lead article suggests that childhood overweight needs to be addressed from a societal perspective because the causes go beyond individual behaviour (Troiano & Flegal, 1998). Another paper points out that abnormal glucose tolerance occurs with increased frequency in obese children and of adolescents (Dietz, 1998). Obesity in childhood tends to persist into adult years. Yet another article points out that the rapid rise in the prevalence of obesity and the fact that it is almost impossible to lose body fat, once acquired, can be taken as evidence that something in the paediatric environment has lifelong consequences (Rosenbaum & Leibel, 1998). When parents make all the decisions about what a child eats and provide few opportunities for choice, children may be unable to regulate their intake (Birch & Fisher, 1998). Physical activity in youth is likely the result of a complex interaction of physiological, developmental, environmental, psychological, social and demographic factors (Khol III & Hobbs, 1998).

Jackson et al., (1991) reviewed behaviour change theories related to prevention and treatment of obesity among minority adolescents in the United States. Lifestyle behaviours are embedded in societal, cultural, familial, environmental and peer-group influences. The article summarizes a number of studies and concludes that for minority adolescents, weight management programs based on empowerment strategies may be most effective in the long term. Empowerment that helps individuals to define, analyze and develop solutions to problems can help to overcome the perception that others control one's health, low self-efficacy and inability to choose appropriate modelling.

A supplemental issue of Journal of the American Dietetic Association summarized proceedings of a meeting to discuss multidisciplinary approaches to weight control (Rippe et al., 1998). Since it is clear that the obesity epidemic is growing rapidly in the United States and that current approaches have been relatively unsuccessful, comprehensive multidisciplinary programs to address a range of risk-related behaviours is proposed (Rippe et al., 1998). Approaches need to include physical activity, diet, behavioural therapy and possibly pharmacological treatments.

Although *Promoting Healthy Weights* was released in 1988, its guidelines have stood the test of time (Health and Welfare Canada, 1988). It suggests that a health promotion strategy for promoting healthy weights should include co-ordination of healthy public policy, strengthening community services and fostering public participation. This requires the cooperation of many partners.

2.2.3 DIET IN THE PREVENTION OF DIABETES

Nutrition affects each stage of the life span; needs in each stage may be quite different (Bidlack, 1996; Health and Welfare Canada, 1990). Nutrition-related health risks have been established for a number of conditions including Type 2 diabetes, cardiovascular disease, cancer and osteoporosis as well as obesity. This report is focused on the reduction of risks for Type 2 diabetes but it is essential to remember that overall nutritional health, affecting all stages of the life span and many conditions, is the prime consideration in making population-based dietary recommendations. It would be inappropriate to make

dietary recommendations to reduce the risk of Type 2 diabetes if they increased the risk of another major condition such as osteoporosis. A World Health Organization report on diet and prevention of chronic diseases insisted on the need for a population-wide, as opposed to individualized, approach to the prevention of nutrition-related chronic diseases (WHO study group, 1990). It further concludes that there is insufficient evidence to allow specific dietary goals for the prevention of diabetes, other than those for prevention of obesity.

It is difficult to separate the effects of nutrients from the effects of body weight, fat distribution and other confounding variables on the development of diabetes but there has been some study of individual nutrients (Manson & Spelsberg, 1994). Diets high in total fat, animal fat, protein or simple sugar or low in carbohydrate have been linked to Type 2 diabetes (Manson & Spelsberg, 1994). These studies were able to establish only associations, however, not causality. It would be an over-simplification to suggest that any one nutrient may cause diabetes (World Health Organization, 1994). The diet most commonly recommended to reduce the risk of diabetes is low in fat and high in fibre-rich foods such as vegetables, fruit, whole grains and legumes. This is consistent with the *Nutrition Recommendations for Canadians* and *Canada's Food Guide to Healthy Eating* which are intended to promote overall health (Health and Welfare Canada, 1990).

A few of the nutrition studies designed to investigate the association between diet and risk of developing Type 2 diabetes will be highlighted to illustrate the trends in findings as well as to show some of the reservations needed in interpreting this complex issue:

1) An eight year longitudinal study of diet and insulin concentrations with a population of adults in Colorado found that diets high in total and saturated fats and low in fibre or starch were associated with high fasting insulin concentrations (Marshall, Bessesen & Hamman, 1997). There was no association with other types of fat or with sucrose, glucose or fructose. Associations were similar with men and women and for active and inactive participants. Other factors that were controlled in the analysis included younger age, being female, Hispanic ethnicity, higher body mass index, higher waist circumference and no vigorous activity.

2) A study in a First Nations community in northern Ontario found associations between higher fat and lower fibre foods and diagnosis of diabetes (Gittelsohn et al., 1997). Unfortunately, it is difficult to apply the findings or to generalize to other settings because the patterns aren't consistent enough and the choice of foods is not the same as in other parts of Canada. There are other surprising findings including that high consumption of bush foods was associated with a two-fold risk for obesity and that those already diagnosed with diabetes appeared to have less desirable eating habits than those first diagnosed in the course of this study. Possible explanations such as the use of bush foods at celebrations are explored in the article. This is an excellent example of the danger in reaching hasty conclusions based on associations between dietary patterns and health.

3) There have been studies of the role of vegetarian or plant-based diets and diabetes. A very large study of Seventh Day Adventists in California found a positive association between mortality due to diabetes among men (but not women) and meat consumption (Snowdon, 1988). There are so many limitations to the study, however, that the results cannot be applied without substantial verification from other studies. For example, the dietary assessment tool was so limited that it couldn't capture information about fat or fibre. People changed their food habits over the course of the study, only deaths, not diagnosis of diabetes among people still living, were counted and other information such as involvement in church activities was not collected. Other studies show that vegetarian diets are often rich in the legumes, whole-grain bread, vegetables and fruit which are promoted in nutrition recommendations (Dwyer, 1988). A major study in China concluded that consuming a variety of plant-based foods reduced the risk of developing chronic diseases such as diabetes (Campbell, Campbell, Parpia, & Chen, 1998). The caution with this study is that the usual eating and activity habits are so different in China compared with Canada that the effects of any variations there would apply to only a small minority of Canadians with similar patterns. It should also be noted that the traditional diet of First Nations Canadians was high in protein, moderate in fat and low in carbohydrate and fibre (Gittelsohn et al., 1997). The Inuit ate primarily protein and fat. The rates of diabetes are rising in these populations at the same time that there is increased use of store-bought foods, including more carbohydrate.

4) Another series of studies has suggested that malnutrition during the prenatal period may put an infant at higher risk of developing diabetes (Law, Barker, Osmond, Fall, & Simmonds, 1992) (World Health Organization, 1994) (Hales et al., 1991). One study looked at the infant records of 5,654 men born from 1920-30 in a Hertfordshire (Hales et al., 1991). Of the 1157 who still lived in the area, 408 had full glucose tolerance tests and anthropometric measurements. Reduced growth in early life was linked to impaired glucose tolerance and Type 2 diabetes. In a second related study of men born in one of two areas of England between 1920-30 or 1935-43, and still living there in the late 1980s or early 1990s (study date not specified), it was found that body weight and BMI were related to birthweight and weight at one year. There was no relationship between waist hip ratio and birthweight in either place or weight at one year in one location (Law et al., 1992). There are a significant number of limitations with these studies. For example, only a small proportion of those born in the areas still lived there. We don't know how many had died and of what causes, how many had moved elsewhere, conditions of pregnancies (such as food rationing which often improved nutritional status during the war years or smoking status), accuracy of the measurements taken at birth, etc. Although there are many good reasons to support optimal prenatal and infant nutrition, these studies are not strong enough to draw definitive conclusions about the risk of diabetes associated with an infant's weight.

An area that has not been studied extensively is the link between hunger or food insecurity and development of diabetes. Hunger, resulting either from lack of resources to secure enough food or due to voluntary limitation to control energy (calorie) intake, can lead to under nutrition and disease (Bidlack, 1996). Hunger is difficult to define and its effects on development of Type 2 diabetes would be extremely hard to separate from the consequences of other risk factors such as socio-economic status and

obesity/weight reduction cycles. It is clear, however, that hunger is a major determinant of a person's ability to follow any nutrition recommendations. There are two points to consider related to hunger: 1) People need to have the resources to secure sufficient, nutritious food; 2) Any dietary intervention to reduce or control body weight must consider the nutritional and psychological well being of the individual (Health and Welfare Canada, 1988). Many studies in Canada and elsewhere have demonstrated that poor people have poorer nutritional status than those with higher incomes (Maxwell & Simkins, 1985). Food, the second most costly item in the budget, becomes the major expendable item when emergencies occur. In 1991 sixteen per cent of Canadians were living below the poverty line (Health Canada, 1993). The rate for children under 18 was 18.3 percent for a total of 1,210,000. The sanctions against obesity have become so strong in some groups that there are radical dieting patterns and widespread body image prejudices.

2.2.4 GESTATIONAL DIABETES

Pregnancy greatly increases the demand for metabolic fuels. All pregnant women become insulin-resistant but less than ten percent develop gestational diabetes (Boden, 1996). Gestational diabetes is a heterogeneous disorder in which age, obesity and genetically determined insulin resistance contributes to the severity of the disease. Women who have had gestational diabetes are at risk for developing Type 2 diabetes later in life. As has been mentioned earlier, there is good reason to conclude that physical activity, including during pregnancy, increases the capacity for glucose transport into muscle and adipose cells (Horton, 1991). It also increases capillary density in muscle and increases intracellular glucose metabolism.

Since women who have had gestational diabetes are at increased risk of developing Type 2 diabetes later in life, it may be particularly wise for them to follow prevention strategies (World Health Organization, 1994).

2.2.5 CONTROL OF IMPAIRED GLUCOSE TOLERANCE WITH DRUG TREATMENT

Currently, there are large trials of different drug treatments to prevent or delay development of diabetes among people with impaired glucose tolerance but the results will not be available for several years (National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Child Health and Human Development, and Office of Research on Minority Health, 1993). It should also be noted that even if the results are positive, this approach is likely to have side effects and would be used only for those at extremely high risk or for those who already have impaired glucose tolerance.

3. PRIMARY PREVENTION OF TYPE 1 DIABETES

While there have been suggestions that viral infections, cow's milk and nutrition could be risk factors for Type 1 diabetes, there is insufficient literature about practical approaches to make any recommendations about primary prevention of this condition. Current scientific evidence does not support a major role for physical inactivity in the development of Type 1 diabetes (Spelsberg & Manson, 1995). It is suspected that Type 1 diabetes follows exposure to an environmental trigger, such as an unidentified virus, that causes the immune system to attack the beta cells of the pancreas (Centers for Disease Control).
An expert panel met to address the concerns in the media regarding the relationship between Type 1 diabetes and immunization (Institute for vaccine safety diabetes workshop panel, 1999). The panel concluded that:

- Both genetic and environmental factors contribute to the risk of diabetes;
- Certain infections are protective against Type 1 diabetes;
- Other infections may increase the risk of diabetes;
- Certain vaccines are protective against Type 1 diabetes in animals but the data in humans are inconclusive; and
- No vaccines have been shown to increase the risk of developing Type 1 diabetes in humans.

4. SETTING PRIORITIES AMONG RISK FACTORS

For screening purposes, it is necessary to review both unmodifiable and modifiable risk factors. When selecting risk factors for intervention programs, however, only modifiable factors are considered. (It isn't possible to change age or genetics.)
Should we put more emphasis on modifying some risk factors than others? The identified modifiable risk factors specific to diabetes are physical inactivity, obesity (high body mass index), upper body obesity (fat pattern) and diet.
The risk factors were analyzed in order to determine their priority or ranking. The criteria used included:

- Seriousness - How much effect would changing the risk factor have on development of the condition? How strong is the link between the risk factor and development of Type 2 diabetes?
- Magnitude - How widespread is the risk factor?
- Effectiveness of interventions - Are there interventions that will work to reduce the risk factor? Are they acceptable to the population of interest?

4.1 Modifiable Risk Factors

The following section summarizes the discussion of the Working Group on Primary Prevention of Diabetes about setting priorities among the risk factors.

4.1.1 PHYSICAL INACTIVITY

Physical inactivity has the highest degree of seriousness as identified in the literature. Studies have consistently found a protective effect from increasing physical activity, independent of whether any weight is lost. The range varied considerably but those who were inactive were up to 3.4 times more likely to develop diabetes. Physical activity was especially beneficial for people who were obese.

It is difficult to assign one number to the prevalence of physical inactivity among Saskatchewan residents. The Saskatchewan Heart Health Survey of adults aged 18 to 74 found that less than half the population participates in more than three hours per week of physical activity in their leisure time (Saskatchewan Health, 1990). The 1995 Physical Activity Monitor found that only 40 percent of adult Canadians were active enough to benefit their cardiovascular health (Canadian Lifestyle and Fitness Research Institute, May 1998). Another 25 percent were moderately active, 25 percent were somewhat active and 10 percent were inactive. Canadian children are less active with age. Children aged one to four spend almost 22 hours per week in physically active play but teenagers spend only 14 hours per week (Canadian Lifestyle and Fitness Research Institute, May 1998). Teenaged girls are less active than boys are. A recent study of adults in Alberta found that 55 percent were defined as physically active (Mummery & Spence, 1998). An additional 10 percent were in the contemplation phase and 20 percent were in the relapse phase of the stages of change model. It is also interesting to note that the percentages of people in the action and maintenance phases were lower for those with low incomes than high incomes.

In terms of effectiveness of interventions, while there are many barriers, there are also many options available. Canadians reported more activity in a 1995 study than they had in 1981 and 1988 (Canadian Lifestyle and Fitness Research Institute, May 1998).

4.1.2 OBESITY AND THE PATTERN OF FAT DISTRIBUTION

Obesity and the pattern of fat distribution were considered together when setting priorities among the risk factors. Each is an independent risk factor but interventions to affect one also change the other; currently there is no safe way to selectively reduce intra-abdominal fat. In terms of seriousness, all forms of obesity raise fasting plasma insulin and exaggerate insulin response to oral glucose (Kopelman, 1997). The Canadian Heart Health Surveys found that the proportion of people who reported having diabetes was much greater at higher BMIs (Rabkin, Chen, Leiter, Liu, & Reeder, 1997). For example, among people aged 55 to 74, 20 percent of men and 14 percent of women with a BMI of 30 or over reported having diabetes compared with half those numbers among those with BMIs of 20 to 24. A prospective American study estimated that the attributable risk due to a weight increase of five kilograms was 27 percent over a 10 year period (Ford et al., 1997). Central body or abdominal obesity is also linked to increased risk of Type 2 diabetes (Rippe, Crossley, & Ringer, 1998).

The magnitude of the obesity problem continues to ring alarm bells. The Heart Health studies found that almost half of adult Canadians are overweight and one in six is obese (Macdonald et al., 1997). The increasing prevalence of obesity among children is a worldwide concern (World Health Organization, 1998). The 1994 NHANES studies in the United States found that more than 10 percent of four and five year old girls were overweight (Ogden et al., 1997). A recent study in lower-income areas of Montreal schools found that one third of students in grades four to six were overweight and 14 percent were obese.

The effectiveness of interventions to reduce obesity is discouraging to say the least (Douketis et al, 1999). In an update of the periodic health examination, the authors concluded that for obese adults

without obesity related disease there was not enough evidence to recommend for or against weight reduction therapy because of the lack of evidence to show it was effective. For obese adults with obesity-related disease such as diabetes, weight reduction is recommended because it alleviates symptoms. Although these authors concluded that there is insufficient evidence to recommend for or against community-based prevention programs, because of the high health risks associated with obesity and limited long-term effectiveness of weight loss, prevention of obesity should be a high priority (Douketis et al., 1999). Others place particular emphasis on the importance of primary prevention of obesity among children including encouragement of physical activity and improved diets (Gortmaker, Dietz Jr, & Cheung, 1990; Ogden et al., 1997).

4.1.3 DIET

The seriousness of diet, as an independent risk factor for Type 2 diabetes, is difficult to determine. As mentioned earlier, diets high in total fat, animal fat, protein or simple sugar or low in carbohydrate and fibres have been linked to Type 2 diabetes (Manson & Spelsberg, 1994). Since these studies show only associations, not causality, it isn't possible to say that a particular diet or nutrient will prevent diabetes (World Health Organization, 1994). Diet is, however, also linked to obesity, another risk factor for Type 2 diabetes. Excessive food intake does contribute to the development of obesity (Rippe et al., 1998). Diets high in fat have also been linked to obesity although limiting fat without limiting energy consumption will not produce weight loss (Rippe et al., 1998). The rapid increase in obesity seen in lower-income countries has been associated with increased consumption of vegetable oils, refined grains, meat and eggs and decreased consumption of coarse grains (Popkin & Doak, 1998). (The shift from manual labour to knowledge-based employment may be having an even larger effect on obesity.)

Canadian dietary data are somewhat limited so it is difficult to estimate the magnitude of dietary risk factors. The results of the Saskatchewan Nutrition Survey are not yet available. The Nova Scotia Nutrition Survey found that 79 percent of adult Nova Scotians consumed a larger proportion of dietary fat than suggested in the Nutrition Recommendations for Canadians (Nova Scotia Heart Health Program, 1993).

In terms of effectiveness, there is some optimism that diets have improved since the 1970-72 Nutrition Canada Survey and that people are able to make dietary changes when advised to do so even if their weight does not always decrease (Pan et al., 1997; Rippe & al, 1998).

4.1.4 DETERMINANTS OF HEALTH AS RISK FACTORS

It is clear that the broad determinants of health such as education, employment, physical environments and social support play a huge role in the development of a range of health problems, including Type 2 diabetes (Working groups of the National Aboriginal Diabetes Strategy, 1998). The Working Group on the Primary Prevention of Diabetes recognized the importance of the underlying determinants of health such as income, education and the physical environment, in any program designed to reduce the risk of diabetes.

While they were not ranked as separate risk factors, the determinants of health must be considered in any program to address primary prevention of diabetes. For example, participation in many types of physical activity can be very costly so it is imperative that interesting, low cost alternatives be available. Canadian adults spend almost $700 a year to be active. Parents spend about $800 a year on a child's physical activity (Canadian Lifestyle and Fitness Research Institute, May 1998). Clearly this is beyond the reach of many low income Canadians. The most popular forms of physical activity in Canada are unstructured, low-cost activities that can be done outside facilities (Canadian Lifestyle and Fitness Research Institute, May 1998). In this regard, another determinant of health, the physical environment, must be considered. Centers for Disease Control analyzed data from several states and found that people who perceived their neighbourhoods to be unsafe were less likely to be physically active (Centers for Disease Control, 1999). Each of the determinants needs to be considered when planning any intervention.

5. PROGRAMS TO EFFECT CHANGE IN RISK FACTORS

Many programs have been developed to reduce risk factors such as physical inactivity, obesity and inappropriate diets. Some programs have been developed to reduce the broader risk factors such as poverty, lack of social support and low education levels.
This section includes:

- A discussion of the need for population-wide programs that alter the environments in which people live;
- An outline of some of the considerations for any behaviour change program;
- A summary of observations about effective programs for Aboriginal communities;
- Examples of a few programs that have been used to reduce risks. Some of these programs focus on conditions other than diabetes but the risk factors and goals are the same as one would find in a diabetes prevention program; (This is not intended to be a complete list of intervention programs, but rather, a short review of some interesting approaches for those who plan to develop their own programs.) and
- A grid to illustrate some of the sectors that should be considered in developing a comprehensive program.

5.1 Population-based and High-risk Approaches

The two major approaches to implementing strategies for primary prevention of diabetes are the population-based and the high-risk approaches. The population approach attempts to reduce risk in the whole community while the high risk approach focuses on individuals who have one or more risk factors (Simmons, Voyle, Swinburn, & O'Dea, 1997).

The high-risk approach has the advantage of building on the medical model that is well established in other areas such as treatment of hypertension. The drawbacks include the requirement for screening and relatively expensive counselling that may need to be lifelong. Living in an environment that promotes the modern diet and very limited physical activity makes it much more difficult to maintain changes. The environment also encourages others to follow the same practices that, in turn, moves them from low risk to high risk categories or to development of diabetes.

Population-based approaches are more likely to result in reduced incidence of Type 2 diabetes because they can reduce risk factors, especially obesity, across the whole population (Simmons et al., 1997). During wars when the food supply was limited, diabetes mortality decreased but, aside from these "natural experiments", it is very difficult to test interventions in a controlled fashion. Other studies have shown that people in a control group often learn about the intervention and begin to make changes on their own.

Egger and Swinburn (1997) propose that an ecological approach is needed to address the obesity pandemic. A shift is needed away from the view that obesity is a personal disorder that requires treatment to an ecological perspective that views obesity as a normal response to an abnormal environment. The large environments in which we live determine the prevalence of obesity in the population and the immediate environment, along with biology and behaviour, influence whether an individual is obese. Historically, epidemics have been controlled only after the larger environmental factors have been altered. We will make the most progress in disease reduction if there are small changes made by a large percentage of the population rather than large changes by a small group. If we better understood the "obesogenic" environment, we would be able to apply the epidemiological methods that have successfully controlled other epidemics.

There is a place for both high-risk and population-based approaches but the nature of Type 2 diabetes and the widespread prevalence of risk factors strongly suggests that the population-based approach is likely to be particularly beneficial (Simmons et al., 1997).

5.2 Behaviour Change

A number of theories have been developed to help us understand behaviour change. They can apply to individuals or to groups. Applying an appropriate theory or theories can improve the chances of successful health promotion. It also makes it easier to evaluate the outcomes of a program. It is not within the scope of this paper to outline these behaviour change approaches in detail; interested readers may refer to Health Behavior and Health Education or other references for more information (Glanz, Lewis, & Rimer, 1997).

Behaviour change approaches are sometimes divided into those affecting individuals and those affecting groups. It is important to note that broad community or organizational models do not stand alone, apart from the individuals who constitute the groups and organizations. We need to consider both individuals and the groups in which they live.

5.2.1 BEHAVIOUR CHANGE BY INDIVIDUALS

The first example is a behaviour change approach for individuals. (This is the transtheoretical model.) Some researchers have found that people go through a number of stages in order to achieve change. An approach that works for someone in one stage may not work for someone in another stage (Prochaska, Redding, & Evers, 1997). The stages and examples of how a person might respond at the different stages is:

- Precontemplation – "I really don't want to change. I'm fine the way I am";
- Contemplation –"I'll consider it";
- Preparation - "I'm making a plan for it";
- Action - "I'm doing it, but not regularly";
- Maintenance – "I'm doing it";
- Termination – "I have no desire to go back to my old ways".

How do you know at which stage an individual is? The following list of questions is adapted from the Canadian Physical Activity, Fitness and Lifestyle Appraisal to assess readiness for change in physical activity (Canadian Society for Exercise Physiology, 1997). The questions correspond to the different stages just listed. Participants are asked to select one answer.

- I am not physically active and I do not plan on becoming so in the next six months.
- I am not physically active, but I have been thinking about becoming so in the next six months.
- I am physically active once in a while, but not regularly.
- I am currently physically active, but have only been so within the last six months.
- I participate in regular physical activity and have done so for more than six months.

(Answer if not currently active)

- I was physically active in the past, but not now. Yes No

Having assessed the stage of change for an individual, an appropriate intervention can be chosen. For example, someone in the preparation stage might be recruited into a fitness program while someone in the maintenance phase might benefit from some support to stay with the program.

Those interested in knowing more about the stages of change related to physical activity may wish to review a 1997 Alberta study that found that among adults, 17 percent were in precontemplation, 10 percent in contemplation, 6 percent in action, 49 percent in maintenance and 18 percent in relapse stages (Mummery & Spence, 1998).

5.2.2 BEHAVIOUR CHANGE BY GROUPS

There are a number of very interesting models for health behaviour change in groups, organizations and communities. Being able to understand and know how to work with people through the social structures that affect their health behaviours is very important (Glanz et al., 1997). These approaches are particularly helpful for groups that want to create healthier institutions and communities. Four examples of community or organizational change theories are:

- Community building emphasizes supporting community groups to take more control over improving their own health.
- Diffusion theory is an example of how people in groups change. It describes the spread of

ideas or behaviours from the those who like to be in the forefront of something new (the innovators and early adopters) to the those who like to wait until the idea has been tested by others (the late majority adopters and laggards).

- There are a number of theories about how people within one organization or people from different organizations work together (Chrislip & Larson, 1994; Glanz et al., 1997). Groups go through stages of development. They also take on an identity of their own with some predictable behaviours. For example, if someone external to the group begins to impose control over it, there will be more conflict and reduced perceptions of effectiveness within the group (Alter & Hage, 1993). This work has particular application for partnerships, coalitions and teams.
- Communications theory or media relations is another example of changing a population group. There is a wealth of knowledge about how media affect different socio-economic groups, their role in social action and communication of risk.

To conclude this section, it is imperative to recognize that our behaviours are governed by a complex set of factors, knowing something is not enough to produce a change. Understanding how individuals and groups change is an invaluable tool in planning and delivering programs. For example, one study found that having less support from exercise staff at the beginning, more support from family and friends and having a home-based program were the strongest predictors of whether people ages 50 to 65 continued with an exercise program for a year (Oka, King, & Young, 1995).

5.3 Prevention Programs in Aboriginal Communities, an Example of the Need to Adapt Programs to Meet Community Needs

A paper prepared for an Aboriginal diabetes strategy outlines requirements for intervention programs in Aboriginal communities (Working groups of the National Aboriginal Diabetes Strategy, 1998). The authors recognize that political, economic and social conditions have such a large effect on health that culturally appropriate, holistic and community-based approaches are needed. It is essential that both formal and informal leaders in the community be involved. It is recognized that western medicine approaches to bring about lifestyle changes in Aboriginal communities have had only limited success. In addition to the physical aspects of the issue, the mental, emotional and spiritual dimensions must be considered. Traditional teachings, ways and values should form the foundations. Successful examples incorporate the traditional concept of balance (the Medicine Wheel), use of traditional foods and promotion of physical activity as a way of being strong rather than getting fit.

The fundamental principles for the success of an intervention for the primary prevention of diabetes highlighted are (Working groups of the National Aboriginal Diabetes Strategy, 1998):

- Community initiation of the program and continuous involvement in it;
- Awareness of the determinants of health, and formation of partnerships with existing groups in the community;

- Ongoing support rather than one-time or short-term interventions;
- Flexibility in programs to meet individual needs;
- Making the interventions part of daily life rather than special activities;
- Promotion of individual responsibility for self-management;
- Offering financial and human resources to initiate new programs;
- Making changes in the physical environment to promote healthy lifestyles. e.g. increased; availability of good food and safe places for physical activity.

5.4 Planning for Action at Many Levels

Policies and programs can affect people as individuals, as members of families, as members of communities and as citizens of a province or country. Policies and programs can also be implemented at different levels. If one was planning an initiative, one might use a planning grid such as the following Table 1:

Table 1: Preventing Obesity in Children, an Example of a Planning Grid

Action group / Who is affected?	Community or local groups	Provincial agencies	National organizations
Individuals	Increase security in parks so children and adults can play safely	- Day care regulations about foods served - Curriculum from Dept. of Education - Training of teachers	Canadian Radio and Television Regulations regarding corporate code of ethics for advertising to children
Families	Having "free" times at recreational facilities for families		
Communities	School boards have policies about physical activity		
Province	Advocacy by parents' groups for daily physical activity in schools		
Country	Research regarding physical activity patterns		

Another way to view primary prevention programs is to consider approaches that affect the whole community as well as individuals at high risk. Both approaches are needed to reduce the risk of developing diabetes (Working groups of the National Aboriginal Diabetes Strategy, 1998). Individual health behaviours are enhanced or hindered by social or physical environmental factors. Policies that affect availability of food, development of facilities for physical activity, control of loose dogs to permit safe walking and creation of smoke-free places affect individuals' ability to make changes.

5.5 Using the Population Health Model to Plan and Implement Programs

A population or determinants of health approach can be used in the overall planning and implementation of programs. Table 2 shows some examples. For more details, see *Population Health Promotion: a Resource Binder* (Saskatchewan Health, 1997).

Table 2: Examples of Strategies to Address the Determinants of Health in Primary Prevention of Diabetes

Build healthy public policy	Strengthen community action	Create supportive environments	Develop personal skills	Reorient health services
INCOME AND SOCIAL STATUS				
-ensure adequate personal incomes to enable people to meet needs for nutritious foods and physical activity -ensure availability of supermarkets in low income areas -ensure availability of economical, nutritious food in rural and remote areas of the province	-develop community kitchens and gardens, cooperative food and clothing exchanges, bicycle helmet and boot exchanges	-provide child care and transportation for activity and nutrition programs -improve availability of necessary clothing for physical activity (e.g. warm winter clothing, shoes)	-support opportunities to borrow, swap or rent, at minimal cost, sports equipment	-use approaches that support personal empowerment to enable individuals to organize initiatives for their communities
SOCIAL SUPPORT NETWORKS				
- enhance social support programs for people who live in isolated circumstances	-communities need to be involved in planning and implementing their own programs	-establish accessible social and recreational opportunities	-free instruction for sports	
EDUCATION				
-education curricula include physical activity, nutrition and body weight components	-encourage peer group education, literacy and community mentoring	-ensure education is culturally sensitive and accessible to those with higher needs	-help to develop assessment skills	-dissemination of knowledge from heart health and related programs to health practitioners
EMPLOYMENT AND WORKING CONDITIONS				
-include development of transferable skills for local people in new projects	-encourage employers to institute physical activity programs, including flexible working schedules	-increase availability of healthy snacks and decrease availability of foods of low nutrient value	-set up stretching or activity instruction in the workplace	

Build healthy public policy	Strengthen community action	Create supportive environments	Develop personal skills	Reorient health services
PHYSICAL ENVIRONMENTS				
-clean air policies	-develop more parks, walking paths and places for free activity -buildings should have useable stairways	-increase perception of safety in public places such as parks and neighbourhoods (e.g. Block Parent programs) -keep sidewalks free of snow in the winter		
BIOLOGY AND GENETICS				
	-in areas with a large number of people at high risk, support concerted community action		-encourage prevention measures to address genetic predispositions	
PERSONAL HEALTH PRACTICES AND COPING SKILLS				
-encourage activities for whole families, have family memberships for some activities -implement Canada's Food Guide to Healthy Eating and Canada's Guide to Physical Activity -have clear nutrition labels on food	-ensure that teachers have the resources necessary to teach/facilitate physical activity and nutrition classes	-workplace wellness programs -facilities for parents to exercise while their children are at the rink, etc. -support community kitchens, cooking programs -provide recreational activity opportunities	-increase consumption of water as beverage of choice -stress benefits of small changes in activity levels and weight loss	-include questions about physical activity and nutrition in medical histories
HEALTHY CHILD DEVELOPMENT				
-open schools for drop in activities -reduce costs for public facilities for physical activity -healthy eating programs	-involve children and parents in planning and improving their physical activity and nutrition practices	-support school lunch and breakfast programs -support Quality Daily Physical Education or related programs	-30- 60 minutes per day of actual physical activity for children - have teen activity nights at community centres	
HEALTH SERVICES				
-reduce insurance premiums for those who are physically active -increase research related to primary prevention of diabetes such as dietary recommendations	-increase community participation in decision-making	-ensure that culturally appropriate services are available	-increase public education on risks and healthy choices -support skill development for obesity management	-continuing medical education for health practitioners -education for undergraduates in health professions -encourage physicians to assess obesity and activity levels and treat or refer as necessary -increase availability of programs for people with multiple risk factors -include the whole family in education or treatment planning

5.6 Examples of Programs to Increase Physical Activity, Achieve and Maintain Healthy Body Weights, Promote Good Nutrition and Improve the Determinants of Health.

5.6.1 PRIMARY PREVENTION PROGRAMS

The following is a list and brief description of a few primary prevention programs that have been implemented to reduce the risk of developing diabetes or conditions with similar risk factors. These are examples only.

- Fly Higher - This program, sponsored by the Heart and Stroke Foundation of Canada, is for young women 13 -18 years (Heart and Stroke Foundation, 1999). It employs community mobilization techniques and is delivered in Saskatchewan in cooperation between the Heart and Stroke Foundation, schools and health districts. Although young women are the target audience, over half of the teams include young men too.
- Heart Health Initiative - This is a countrywide multi-level strategy for the prevention of cardiovascular disease in Canada (Canada, various, 1997). It has created extensive networks and coalitions involving Health Canada, the ten provinces, Heart and Stroke Foundation of Canada and over 1000 organizations in different sectors. The objective is to reduce cardiovascular disease, attendant risk factors and socio-economic determinants. This initiative has provided a wealth of information. In Saskatchewan the current initiatives focus on capacity building for health promotion in the health districts.
- Kahnawake Schools Diabetes Prevention Project - This is a three-year, primary prevention program for Type 2 diabetes (Macaulay et al., 1997). It has used a combination of 63 distinct interventions with both health curriculum and environmental interventions. A total population approach is used because it is more supportive of the culture, values and traditions of the community.
- North Karelia Project - A mass media and work-site and school-based program developed with broad community participation was initiated in 1972 in an area of Finland with extremely high rates of cardiovascular disease (Puska et al., 1985; Salonen, Tuomilehto, Nissinen, Kaplan, & Puska, 1989; WHO, 1998). It integrated the program into existing or newly created community services and structures. Structural and legislative changes were adopted. There have been remarkable decreases in heart disease risk factors although obesity remains the same throughout the project. One conclusion is that a major demonstration project can enhance risk reduction (Puska et al., 1985).
- Pathways is a partnership between six American Indian nations, university investigators and the National Heart, Lung and Blood Institute (Caballero et al, 1999; Davis et al., 1998). This study is midway through an intervention to decrease obesity among Native American peoples by promoting physical activity and healthful eating behaviours. Participants are third through fifth grade American Indian children. It includes four culturally appropriate components: curriculum, physical activity/recess, food service in the schools and home/family involvement.
- Stanford Three Community Project and Stanford Five City Study - These programs used mass media, interpersonal education and community organization to increase awareness and knowledge about heart disease and to teach skills required for behaviour change (National

Heart, 1990; WHO, 1998; Young, Haskell, Jatulis & Fortman, 1993). In the two studies the intervention groups did not gain weight or gained significantly less than the control groups.

5.6.2 WORLD HEALTH ORGANIZATION (WHO) REPORT

Although it is not an intervention project, the WHO report on obesity should also be highlighted because of its depth in analysis and approaches to obesity (WHO, 1998). Much of this report could be adapted to deal with other risk factors.

The WHO report on obesity summarizes some of the main features of programs that have been successful in reducing risk factors (WHO, 1998).

- Adequate duration of the program - e.g. In North Karelia, changes in the first 10 years of the campaign were modest but there have been marked improvements in risk factors.
- A slow and staged approach - e.g. We can learn from the experience with smoking changes that it takes time to support the transition from awareness through motivation to change. It is unrealistic to expect rapid changes in complex behaviours such as eating and activity.
- Legislative action - e.g. In some cases, such as seat belt use, it has been necessary to require change through legislation in addition to providing education.
- Education - e.g. Education can encourage and support a change in behaviour while avoiding the feeling that change is being imposed without reason.
- Advocacy - e.g. Strong advocacy from respected people from all sectors of society has been a key feature in many changes.
- Shared responsibility by citizens, communities, food industry and governments- e.g. In Portugal, a concern about the high rates of hypertension required concerted action by all sectors and resulted in significant changes within a year.

6. CONCLUSION - A CALL TO ACTION

Reducing the risk of developing Type 2 diabetes requires action at national, provincial, health district, community, family and individual levels. It also requires action by and with partners outside the health sector. Everyone with an interest in this important subject is challenged to take action to reduce the risks of developing diabetes.

Type 2 diabetes can be prevented or significantly delayed for many people. The Primary Prevention of Diabetes Working Group recommends that regular physical activity, healthy body weights and appropriate diet are the priorities for reducing the risk of Type 2 diabetes. The Group also recognizes that the determinants of health, especially socio-economic status, education and working conditions play a significant role in most illnesses, including diabetes. The best evidence in terms of risk factors and intervention strategies should be used to develop programs to reduce the ever rising numbers of people who are developing Type 2 diabetes.

7. REFERENCES – see Appendix 3

Appendix 2

Services for Diabetes Education, Care and Treatment

Diabetes Education Services

Provincial Programs in Canada

- Nova Scotia
- Manitoba

Saskatchewan Diabetes Education Services – population groups and services

Health Districts Without a Designated Diabetes Nurse Educator (Map)

Summary of Key Data from Health Districts Participating in the Utilization Study

Staffing Ratios in Health Districts

Focus Group Results With People With Diabetes

References in Appendix 3

Services for Education, Care and Treatment

Provincial Programs in Canada

As part of the data collection and review of the current state of diabetes education, care and treatment two provincial programs were reviewed in detail. The following presents a brief synopsis of each program.

Diabetes Care Program in Nova Scotia (DCPNS)

The DCPNS was implemented in 1991 and is funded by the Nova Scotia Department of Health and endorsed by the governing bodies of health care disciplines directly involved in the provision of health care to people with diabetes. Through the DCPNS there is promotion of improved standards of care for people with diabetes, improved continuing education access for diabetes education staff and the collection and analysis of information related to diabetes and diabetes education in Nova Scotia.

There are two groups involved in the implementation of the DCPNS – the Board of Directors and the Action Group. Board membership includes representation from health and diabetes-related organizations. The Action Group develops and implements the approved plans of the DCPNS. The Program is staffed with three full-time positions (a Co-ordinator, a Nurse Consultant and a Secretary/Officer Manager), a part-time Medical Director, a part-time Data Manager/Administrator, along with the contract services of an Epidemiologist.

The DCPNS works with the staff (nurses, dietitians, medical advisors/directors and others) of diabetes education centres (DEC) in Nova Scotia. There are 35 DECs in Nova Scotia with 11 operating full-time and the remainder on a part-time basis. Other professionals and groups are also included in the in-services and the promotion of resources and current information.

Some of the activities and outcomes of the DCPNS include:

- Quarterly newsletter with a distribution of over 500 copies;
- In-services/workshops on the local, regional and provincial level;
- DEC surveys – completion of evaluative criteria and a two day site visit to complete chart audits, interview stakeholders and observe the operational and educational processes;
- Developed and provide: standardized documentation forms, statistics keeping forms, physician referral forms;
- Established and now maintain registries/databases for diagnosis of new cases and services provided by DECs;
- Produced eight guideline papers to address self-care practices in Nova Scotia;

- Piloting indicators of care program for use by DECs. This will allow for the collection and analysis of data from the standardized flow sheet; and
- Worked with CDA and CNIB on a province-wide initiative focused on diabetes complications.

Diabetes Education Resource Program (DER) – Manitoba

This program was established in 1985 and is centrally coordinated from the Public Health Branch of Manitoba Health. DER is regionally delivered from 12 province-wide, community based centres. The purpose of the program is to reduce the incidence and prevalence of diabetes and its complications amongst the people of Manitoba through primary, secondary and tertiary diabetes education.

The program is developed, evaluated and monitored centrally through Diabetes and Chronic Diseases Unit of Public Health. This includes:

- Program standards of education;
- Program standards of service delivery;
- Standards of health professional education;
- First Nations community pilot projects;
- Healthy public policy as it relates to all levels of prevention, education, care, research and support for the people of Manitoba;
- Industry liaison; and
- With the Epidemiology Unit – ongoing surveillance.

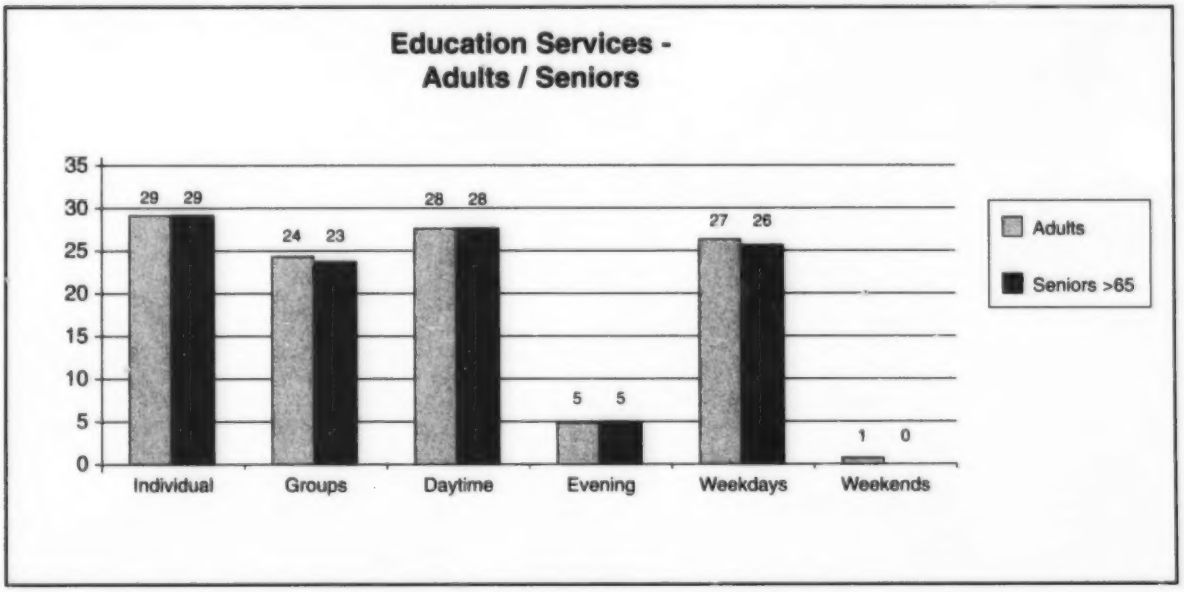
The central staffing includes 5.2 FTEs: Manager, Unit Consultant, Prevention Consultant, Education Consultant, Medical Advisors for adult and pediatric care and clerical support.

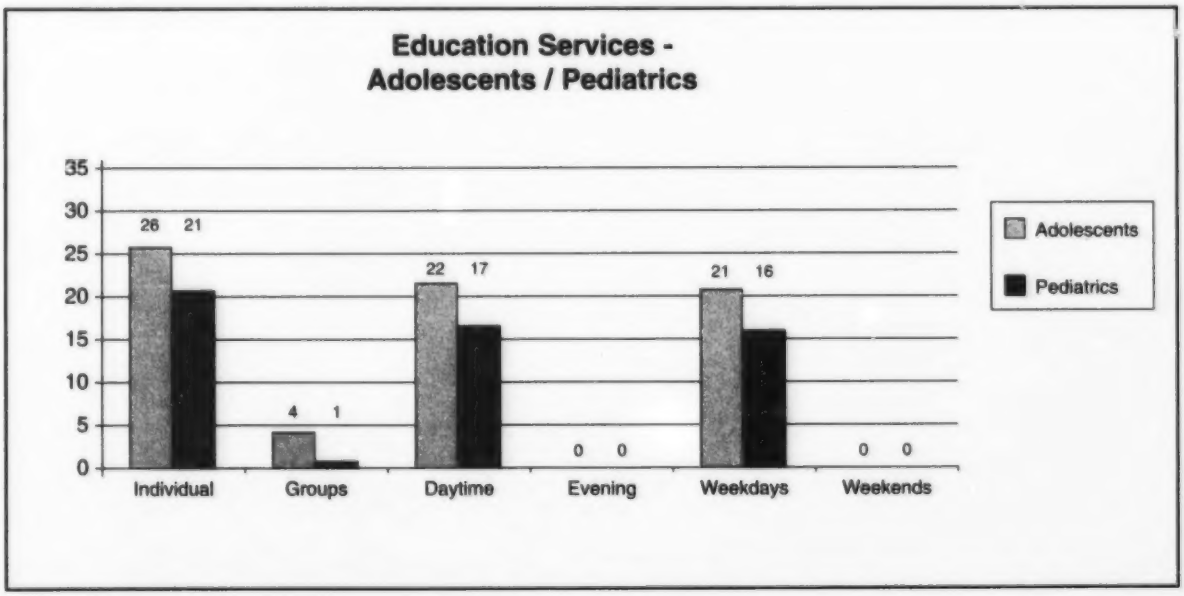
The program has produced:

- Six manuals that are used in the DERs for client and family education to provide standards for the curriculum content and consistency throughout the province;
- Diabetes education standards for both the education program and the program delivery based on national standards and adapted to Manitoba;
- Guidelines for community development based on Community Health Promotion in Action to encourage private and public sector organizations to adopt health promotion activities and priorities;
- Annual on-site review with each DER;
- Program evaluation pilot;
- DER database; and
- Burden of Illness surveillance data.

Diabetes Education Services in Saskatchewan – population groups and services

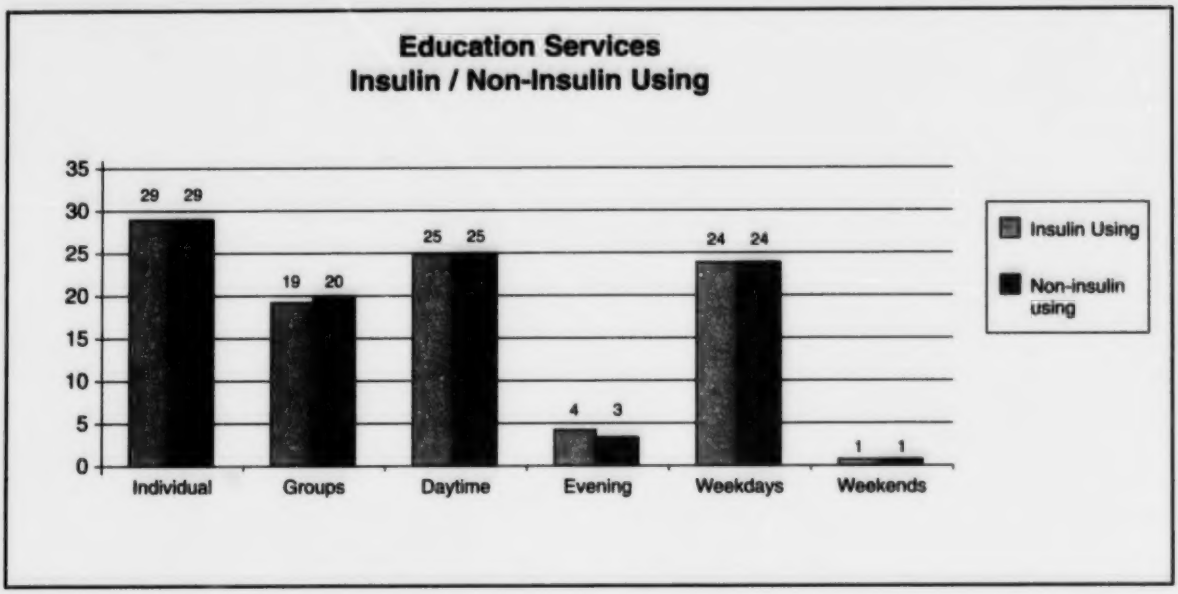
Data was collected from 32 Health Districts. The following four graphs show the number of Districts providing services either individually and/or in groups to different populations of people with diabetes. The graphs also illustrate the timing of services: daytime, evening, weekday or weekends. Restricting the timing of services may restrict access for some clients.

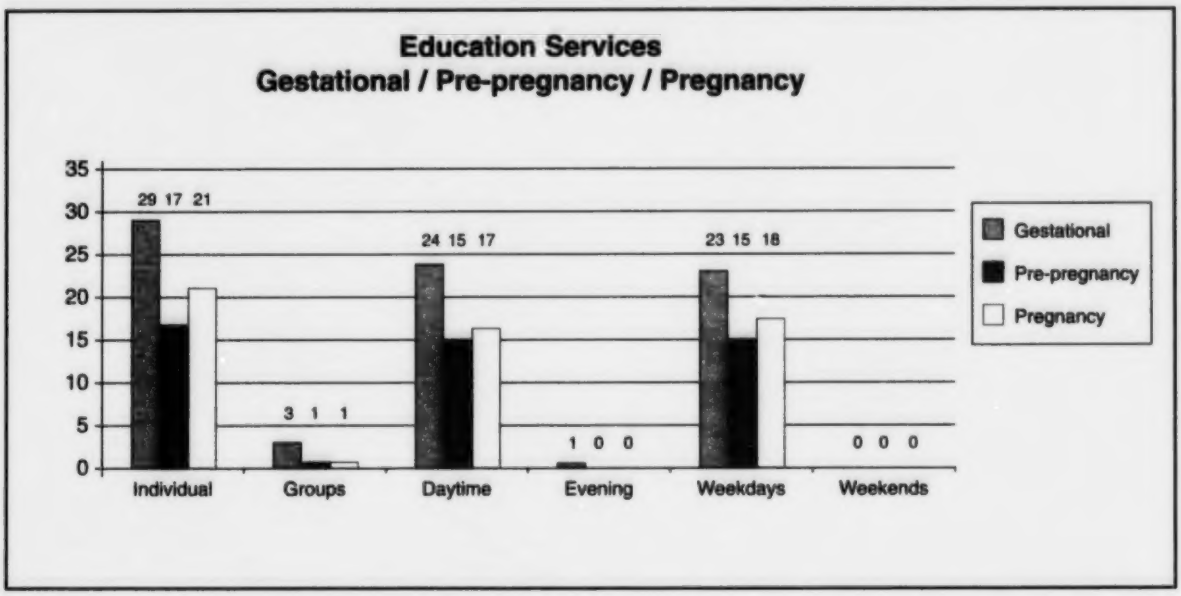




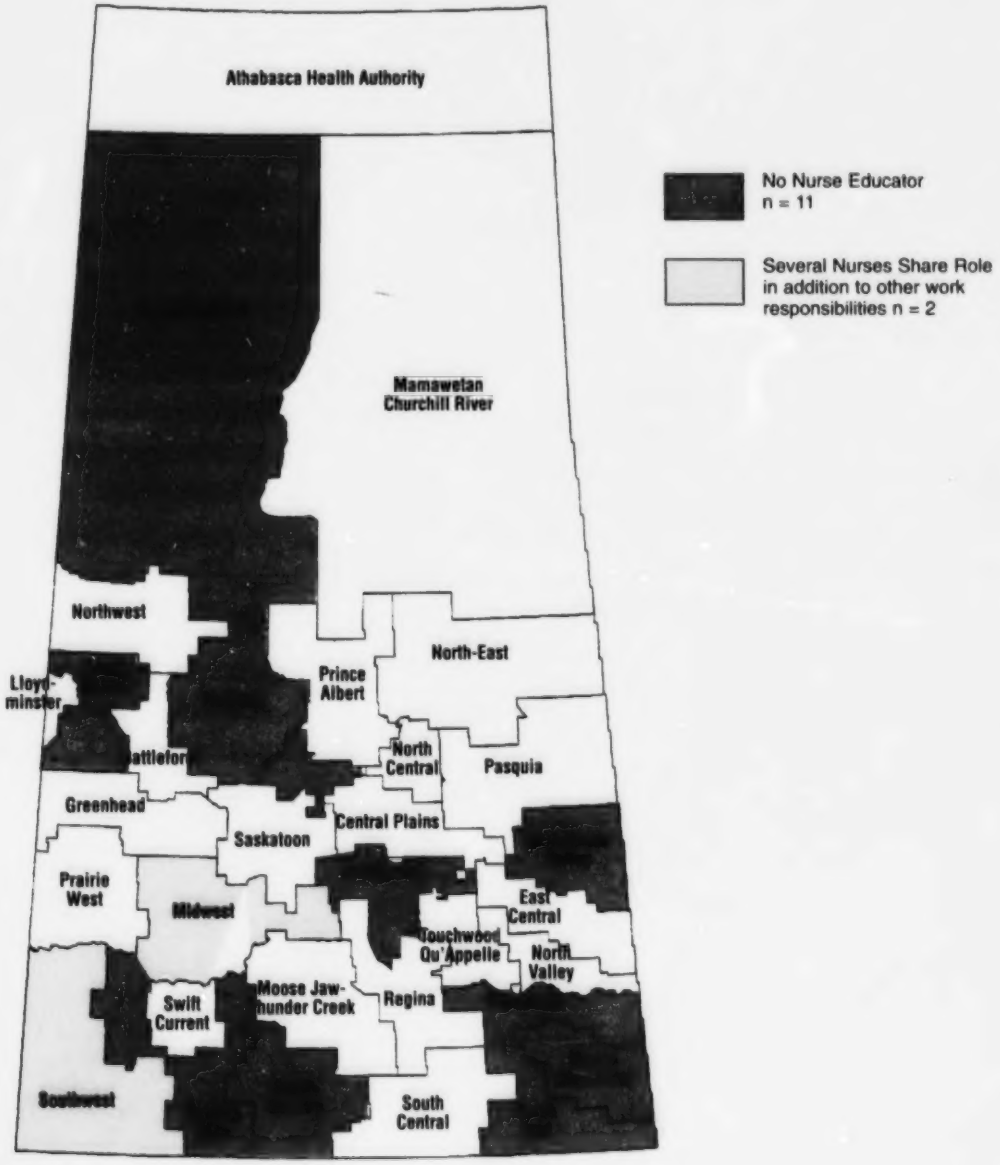
Diabetes Education Services in Saskatchewan

- continued





Health Districts Without a Designated Diabetes Nurse Educator



Summary of Key Data From Health Districts Participating In the Utilization Study

Eight Health Districts participated in a more detailed review of their services: Greenhead, East Central, Moose Jaw/Thunder Creek, Moose Mountain, North-East, Regina, Saskatoon. These Districts represent the diversity in both populations served and services provided.

Background notes to Table 1 on the following pages.

1. Age-Sex Adjusted Prevalence Rate in HD - Taken from *Epidemiological Account of Diabetes in Saskatchewan*, February 1999.

2. Diabetes Education Services/Ratio to Services to People with Diabetes (PWD) – Data provided by Health District staff. See separate table for data for all Districts.

3. Wait List – Seven of eight Districts have clients waiting for service. Some Districts are experiencing wait lists for the first time (Greenhead, North-East). These waits and the lengthening wait in the other Districts appear to be related to the implementation of the new diagnostic criteria for diabetes recommended in the Clinical Practice Guidelines. Earlier diagnosis will lead to earlier treatment and prevention of diabetes complications.

4. Follow-up Continuing Service – Six of eight provide an ongoing recall system for their clients. Regular follow-up care and continuing education are recommended in both the Clinical Practice Guidelines and the Standards for Diabetes Education in Canada. Two Districts cannot provide this service, except in selected cases (children, pregnant women, very special cases), due to their wait list.

5. Insulin Starts for Outpatients – Outpatient insulin starts rather than admission to hospital has become common practice in most Districts. Districts without a diabetes nurse educator cannot offer this service.

6. Foot Care/Blood Pressure Checks – Two standards identified by Nova Scotia program as improvements with provincial co-ordination. One of eight programs provides foot checks for all clients; two of eight provide pressure checks for all clients.

7. Accessibility to Diabetes Services – The criteria listed are national standards taken from Standards for Diabetes Education in Canada (1995).

Table 1 - Summary of Key Data from Health Districts Participating in the Utilization Study

	Living Sky	Moose Mtn	Greenhead	N. East	E. Central	MJTC	Regina	Saskatoon
[illegible] Age-Sex Adjusted Prevalence = 37/1000								
Age- Sex Adjust Prevalence Rate	32.8	32	36.3	48.6	37.6	34.1	37.6	32.1
Number of People with Diabetes	599	519	619	823	1451	1774	7313	6485
Total Population	15,055	12,925	15,755	17,875	31,485	46,875	206,125	227,210
Aboriginal Population								
N. American Indian	35	Not available	25	1,655	450	185	6,770	6,785
Metis	225	Not available	20	230	230	110	1,150	1,420
Total	260	Not available	45	1,885	680	295	7,920	8,205
Number of Reserves in HD	0	2	0	3	1	0	1	1
Diabetes Education Services(DES)								
Dietitian FTE	0.4	0.5	0.9	0.4	0.38	0.7	2.85	2.16
Nurse Educator FTE	0	0	0.5	0.2	0.5	1	5	2.76
Total FTE	0.4	0.5	1.4	0.6	0.88	1.7	7.85	4.92
Ratio of DES to People with Diabetes (1FTE:)	1498	1038	442	1372	1649	1044	932	1318
Waiting List Identified	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Follow-up/continuing service provided	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Specific Services – Outpatient Insulin starts	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Foot Care	No	No	No	No	No	Yes	No	No
Blood Pressure Checks	No	No	Yes	No	No	Yes	No	No
Individual Education - Adults/Seniors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pediatrics/Adolescents	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gestational	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group Education - Adults/Seniors	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pediatrics/Adolescents	No	No	No	No	No	Yes	No	No
Gestational	No	No	No	No	No	No	No	Yes
First Nations - on reserve education	No	No	No	Invitation	No	No	Invitation	Invitation

Table 1 *(continued)* - Summary of Key Data from Health Districts Participating in the Utilization Study

	Living Sky	Moose Mtn	Greenhead	N. East	E. Central	MJTC	Regina	Saskatoon
[redacted]								
Endocrinologist	No	No	No	No	No	No	Yes	Yes
Internist	No	No	No	No	Yes	Yes	Yes	Yes
Medical Director	No	No	No	No	No	Yes	Yes	Yes
Ophthalmologist	Yes	Visits	No	No	Yes	Yes	Yes	Yes
Optometrist	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Podiatrist	Visits	Yes	Yes	Visits	Yes	Yes	Yes	Yes
Mental Health/Social Workers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
[redacted]								
Within 48 hours:								
Uncontrolled diabetes, symptomatic...	S	S	S	P/S	P/S	P/S	P	P
Newly dx Type 1	n/a	P/S	P/S	P/S	P/S	P	P/S	P
Preg. Women w pre-existing diabetes	P	P	No	S	n/a	P	No	No
Recent Diabetic Ketoacidosis, severe hypoglycemia	?	P/S	S	S	?	S	P/S	P/S
Individuals with diabetes crisis	P	P/S	P	P/S	P	P	P	P
Within 1-2 weeks: Gestational Diabetes	P	P	P	P	P	P	P	P

P = Primary diabetes education – nurse educator/dietitian team who devote a dedicated portion of their work time specifically to diabetes education
S = Secondary diabetes education – others who provide some diabetes education amongst many other activities in their job description (examples include: acute and home care nurses, inpatient dietitians, community pharmacists)

M121

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Calculations for Diabetes Educator Staffing Source: Manitoba Health

Manitoba has a similar population of people with diabetes and has developed three recommended ratios for Diabetes Educator Staffing based on ten years of experience:

- 1 FTE to 800 people with diabetes in urban centres;
- 1 FTE to 600 people with diabetes in rural areas;
- 1 FTE to 300 people with diabetes in northern areas.

If we use the Manitoba Health recommendations for 1 FTE for a certain number of persons with diabetes and apply this to the following health districts we can get a relative indication of adequate staffing levels (Tables 2, 3 and 4).

Staffing Ratio in Health Districts

The first seven programs/health districts (Table 2) do not travel within their Districts so the ratio for urban centres of 1:800 was applied. This ratio only accounts for the number of people resident in the health district and does not include referrals into the district; for example, tertiary care (children, pregnant women).

Table 2. Actual and Recommended Staffing Ratio for Urban Centre Districts

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Battlefords	0.64	0.5	1.14	1129	990	800	1.4	0.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Swift Current	0.5	0.5	1	973	973	800	1.2	0.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Prince Albert	0.5	1	1.5	2074	1383	800	2.6	1.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MJ Thunder Ck	0.7	1	1.7	1774	1044	800	2.2	0.5

EXPLANATION OF COLUMNS IN TABLES 2, 3 AND 4

1. Health District.
2. PDt – total FTE – full-time equivalent dietitian time in the District that is dedicated to diabetes education. If a dietitian works full-time and spends 50 percent of her time dedicated to diabetes education, this will be listed as 0.5 FTE.
3. DNE – total FTE – full-time equivalence diabetes nurse educator in the District that is dedicated to diabetes education.
4. Total – combination of dietitian and diabetes nurse educator FTEs.
5. No. PWD. – number of people with diabetes taken from Epidemiological Account of Diabetes in Saskatchewan – Diabetes Prevalence Rates in Health Districts, 1996.
6. 1 FTE:PWD – ratio of one full-time equivalent (taken from total in column 4) to the number of people with diabetes (column 5).
7. Ratio rec – ratio recommended from Manitoba Health.
8. Total staff rec'd – staffing recommended when the Manitoba Health recommendation is applied.
9. Change – difference between present staffing and the Manitoba recommendation.

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Battlefords	0.64	0.5	1.14	1129	990	800	1.4	0.3
Regina	**2.85**	**5**	**7.85**	**7313**	**932**	**800**	**9.1**	**1.3**
Swift Current	0.5	0.5	1	973	973	800	1.2	0.2
Saskatoon	**2.16**	**2.76**	**4.92**	**6485**	**1318**	**800**	**8.1**	**3.2**
Prince Albert	0.5	1	1.5	2074	1383	800	2.6	1.1
East Central	**0.38**	**0.5**	**0.88**	**1415**	**1608**	**800**	**1.8**	**0.9**
MJ Thunder Ck	0.7	1	1.7	1774	1044	800	2.2	0.5

EXPLANATION OF COLUMNS IN TABLES 2, 3 AND 4

1. Health District.
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7. Ratio rec – ratio recommended from Manitoba Health.
8. Total staff rec'd – staffing recommended when the Manitoba Health recommendation is applied.
9. Change – difference between present staffing and the Manitoba recommendation.

Table 3. Actual and Recommended Staffing Ratio for Rural Area Districts

Health District	PDt - total FTE	DNE - total FTE	TOTAL	No. PWD	1FTE: PWD	Ratio Rec	Total Staff Rec'd	Change
Assinboine Val.	0.5	0	0.5	1089	2178	600	1.8	1.3
Central Plains	0.53	0.1	0.63	949	1506	600	1.6	1.0
Gabriel Springs	0.38	0	0.38	520	1368	600	0.9	0.5
Greenhead	0.9	0.5	1.4	619	442	600	1.0	-0.4
Living Sky	0.2	0	0.2	599	2995	600	1.0	0.8
Lloydminister	0.2	0.25	0.45			600		
Midwest	0.5	0.2	0.7	673	961	600	1.1	0.4
Moose Mtn	0.5	0	0.5	519	1038	600	0.9	0.4
North Central	0.4	0.5	0.9	549	610	600	0.9	0.0
North East	0.5	0.2	0.7	823	1176	600	1.4	0.7
North Valley	0.3	0.05	0.35	724	2069	600	1.2	0.9
Northwest	0.375	0.2	0.575	494	859	600	0.8	0.2
Parkland	0.5	0.1	0.6	862	1437	600	1.4	0.8
Pasquia	0.5	0.5	1	811	811	600	1.4	0.4
Pipestone	0.5	0	0.5	1002	2004	600	1.7	1.2
Prairie West	0.35	0.35	0.7	526	751	600	0.9	0.2
Rolling Hills	0.45	0	0.45	517	1149	600	0.9	0.4
South Central	0.4	0.4	0.8	897	1121	600	1.5	0.7
South Country	0.3	0	0.3	530	1767	600	0.9	0.6
Southeast	0.6	0	0.6	904	1507	600	1.5	0.9
Southwest	0.33		0.33	651	1973	600	1.1	0.8
Touchwood Qu'A	0.5	0.2	0.7	798	1140	600	1.3	0.6
Twin Rivers	0.5	0	0.5	661	1322	600	1.1	0.6

Table 4. Actual and Recommended Staffing Ratio for Northern Area Districts

Health District	PDt - total FTE	DNE - total FTE	TOTAL	No. PWD	1FTE: PWD	Ratio Rec	Total Staff Rec'd	Change
MCRHD	0.5	0.5	1	563	563	300	1.9	0.9
Keewatin Yathe	0	0	0	352		300	1.2	1.2
Athabasca area	0	0	0	28		300	0.1	0.1

Table 3. Actual and Recommended Staffing Ratio for Rural Area Districts

Health District	PDI - total FTE	DME - total FTE	TOTAL	No. PWD	1FTE: PWD	Ratio Rec	Total Staff Rec'd	Change
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Central Plains	0.53	0.1	0.63	949	1506	600	1.6	1.0
Gabriel Springs	0.38	0	0.38	520	1368	600	0.9	0.5
Greenland	0.9	0.5	1.4	619	442	600	1.0	-0.4
Living Sky	0.2	0	0.2	599	2995	600	1.0	0.8
Lloydminster	0.2	0.25	0.45			600		
Midwest	0.5	0.2	0.7	673	961	600	1.1	0.4
Moose Mtn	0.5	0	0.5	519	1038	600	0.9	0.4
North Central	0.4	0.5	0.9	549	610	600	0.9	0.0
North East	0.5	0.2	0.7	823	1176	600	1.4	0.7
North Valley	0.3	0.05	0.35	724	2069	600	1.2	0.9
Northwest	0.375	0.2	0.575	494	859	600	0.8	0.2
Parkland	0.5	0.1	0.6	862	1437	600	1.4	0.8
Pasqua	0.5	0.5	1	811	811	600	1.4	0.4
Pipestone	0.5	0	0.5	1002	2004	600	1.7	1.2
Prairie West	0.35	0.35	0.7	526	751	600	0.9	0.2
Rolling Hills	0.45	0	0.45	517	1149	600	0.9	0.4
South Central	0.4	0.4	0.8	897	1121	600	1.5	0.7
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MCRHD	0.5	0.5	1	563	563	300	1.9	0.9
Keewatin Yatthe	0	0	0	352		300	1.2	1.2
Athabasca area	0	0	0	28		300	0.1	0.1

The sum of all existing positions is 33.8 FTEs. The sum of the new positions needed to achieve Manitoba's recommended standards is 22.5 FTEs.

Lloydminister is the only health district not included in the calculations. The city of Lloydminister straddles the border with Alberta making accurate statistics difficult to obtain and verify.

Focus Group Results with People with Diabetes

PURPOSE

To assist the Provincial Advisory Committee on Diabetes to fulfil its mandate, the working group on education, care and treatment of diabetes did an extensive survey of existing services. As part of the data collection, the working group requested input from people with diabetes to gain their perspectives as consumers of education, care and treatment and also as people living day to day with diabetes.

PROCESS

An interview guide was developed to focus discussion on issues related to access to services, acceptability of services to meet initial (at diagnosis) and ongoing needs of people with diabetes and continuity of services from one location/care provider to another. An experienced facilitator led each group and a recorder was present. The interview guide was tested with three experienced people with diabetes. Minor revisions were made. The interview is appended to this report.

Limitations Although the interview guide was similar in all the groups, this was a qualitative process and participants were free to bring up their own issues. The small numbers limit generalization of the results.

RESULTS

Analysis was done using qualitative research methods and major themes were identified. Some areas were identified where further exploration with people with diabetes may be beneficial.

Participants Six focus groups representing four communities were held with people with diabetes. Two communities were in rural Saskatchewan; one was a rural city and one a large urban city. Twenty-eight people with diabetes participated in focus groups: six had been diagnosed within the last year and the remainder having been diagnosed between two and twenty-six years. The participants represented the three common treatment modalities: diet alone, oral agents and insulin.

Major Recommendations of Focus Groups to the Advisory Committee

At the conclusion of each focus group, participants were asked to summarize their recommendations to the Advisory Committee. The following points are a composite from all the groups.

1. Public Awareness of Diabetes.
   All the groups discussed the need for a greater public awareness of diabetes, its care and treatment. The need for awareness was mentioned in several contexts.

   Some felt people had a lack of understanding of diabetes and were actually embarrassed to be known as someone with diabetes.
   - In a smaller community, group members felt their grocers did not understand the importance of a selection of diet pops and dietetic foods to quality of food choices.
   - Many stated that until they themselves had diabetes, they had little understanding of diabetes.
   - One gentleman felt strongly that physicians might be able to anticipate those "at risk" to develop diabetes and be able to recommend preventative measures to avoid or delay the diagnosis, for example, weight loss.

2. Education for Physicians about Diabetes Care and Management.
   Although the need for other professions to be educated about diabetes was mentioned, the most commonly identified were physicians. Most felt that physicians did well with diagnosis, early referral for education and basic information at diagnosis, but felt a gap for ongoing care and management. Some who were quite experienced and/or well read felt they were guiding the physician. People also want very specific feedback from their physicians, to be told that a test result is "OK" is not acceptable to most.

3. Coverage for Diabetes Care Supplies (particularly the strips for blood glucose monitoring).
   Although many acknowledge the high cost of testing supplies, the majority in our groups had some type of insurance coverage. The CDA Advocacy Survey (1997) and the many calls to the Division Office, indicate that the group members may be unique in this quality of coverage. Some did worry how they would manage if the did not have insurance or what will happen when they retire and no longer have coverage from their workplace. People described the critical importance of blood glucose monitoring to them in their day to day diabetes care and management.

References in Appendix 3

Appendix 3

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Appendix 1

Glossary

Aboriginal - For the purpose of this report, Aboriginal describes the following groups: First Nation people living on or off reserve, Non Status Indian people living on or off reserve, and Metis people.

Age Standardization is a statistical adjustment that allows for a more accurate comparison of disease rates or death between two populations when they have very different age structures.

Body mass index is weight in kilograms divided by height in meters squared. For example, for someone 1 7 meters (67 inches) tall, weights between 59 and 72 kg. (128-160 lb.) would fall within the BMI range of 20-25.

Cardiovascular Disease (CVD, Heart Disease) is defined as any abnormal condition characterized by dysfunction of the heart and the blood vessels. People with diabetes have a substantially increased risk of developing cardiovascular disease. Complications of cardiovascular disease include stroke, heart attacks, congestive heart failure and an increased risk of needing coronary bypass surgery.

CPG - Clinical Practice Guidelines (1998)

Diabetes mellitus is a chronic condition that arises when the pancreas does not produce enough insulin or when the body can not effectively use the insulin produced.

Diabetic Neuropathy - A disease of the nervous system. Diabetes can cause damage to the nervous system, resulting in loss of sensation and motor function, particularly in the lower limbs. This condition is seen frequently in older people with diabetes and can lead to amputations.

ESRD - End Stage Renal Disease

FTE - Full-time equivalent. A person who is employed full-time. The use of FTE takes into account holidays and other time-off benefits.

GDM - Gestational Diabetes Mellitus

Gestational Diabetes Mellitus (GDM) is a form of diabetes that develops during pregnancy. It occurs when the mother's glucose level rises due to hormone secretions and she cannot produce enough insulin to handle the higher blood glucose levels. Although gestational diabetes usually does not last after pregnancy, women who have had gestational diabetes have a higher risk of developing Type 2 Diabetes Mellitus in the future.

Hyperglycemia is an abnormally high concentration of glucose in the blood. This can be fatal if severe and left untreated.

Hypoglycemia is an abnormally low concentration of glucose in the blood. The effect of this is a variety of symptoms, including blurred vision, a dry mouth and sweating. If not reversed this can lead quite suddenly to unconsciousness.

Hypertension is a medical term for high blood pressure. A common disorder which is characterized by a blood pressure that exceeds 140/90. Hypertension can lead to health problems such as heart attacks and strokes. The risk of acquiring the disorder is increased by a number of conditions: inactivity, obesity, high salt diet, smoking and family history.

IDDM – Insulin dependent diabetes mellitus –Type 1 diabetes

IFG - Impaired Fasting Glucose

IGT - Impaired Glucose Tolerance

Impaired Fasting Glucose (IFG) – A fasting plasma glucose that is between 6.1 and 6.9 mmol/L, this is not normal and is not high enough to be diagnostic of diabetes.

Impaired Glucose Tolerance (IGT) – Fasting blood glucose < 7.0 and a 2 hour plasma glucose after a 75 gram glucose load between 7.8 and 11.0. An intermediate form of disordered glucose metabolism in which blood glucose levels are higher than expected, but do not meet the diagnostic criteria for diabetes. Persons with IGT have a higher risk of developing Type 2 Diabetes Mellitus in the future.

Incidence is the number of new cases of disease, or events in a population at risk, over a particular period of time (generally one year). Incidence is often expressed as a ratio, in which the number of cases is divided by the population at risk and expressed per 1000 or per 100,000. For example, the number of new cases of diabetes Type 2 in children a year over the number of children in the population x 1000.

Microalbuminuria is a condition in which small amounts of albumin are excreted in the urine and needs a special test for diagnosis. Albumin is a type of protein that is normally found in the blood. The presence of albumin in the urine indicates damage to the kidneys from diseases such as diabetes. Intensive treatment of persons at risk may reverse this process.

Microvascular disease is abnormalities of small blood vessels directly caused by diabetes. The effects of this are retinopathy, nephropathy and neuropathy.

Morbidity Rate is a type of incidence rate. It is the rate of non-fatal, new cases of a disease in the total population at risk during a specific period of time.

Mortality Rate is the number of people who die from a specific illness in relation to the total population. Mortality rates are usually expressed as the number of deaths per 1,000, 10,000, or 100,000 persons.

NIDDM – Non insulin dependent diabetes mellitus. This older nomenclature has been replaced by 'Type 2 diabetes' (which in some cases can be insulin dependent).

Nephropathy is disease of the kidneys. This complication can lead to kidney failure and if untreated, death.

Neuropathy is disease of the nerves. The symptoms of this complication are pain and lack of sensation in the legs and feet.

Peripheral Neuropathy is any functional or organic disorder of the peripheral nervous system. Peripheral neuropathy manifests itself as absence of reflexes and impaired nerve conduction, and usually involves pain and decreased sensation in the lower limbs. In severe cases it can lead to ulcers and amputation.

Prevalence is the number of old and new (existing) cases of a disease or occurrences of an event during a particular period of time. Prevalence is expressed as a ratio in which the number of cases is divided by the population under consideration.

Primary Diabetes Education is a nurse educator/dietitian team who devotes a dedicated portion of their work time specifically to diabetes education.

Primary Prevention

1. Stopping or delaying the development of a disease.
2. The promotion of health by personal and community wide efforts directed toward the improvement of the general well being of the individual while also involving specific protection against selected diseases. Primary Prevention may involve the promotion and adoption of healthy lifestyles: improving nutritional status, physical fitness, and immunization against infectious diseases and promoting safe environments. The purpose of primary prevention is to limit the incidence of disease by controlling causes and risk factors.

Renal Failure/End-Stage Renal Disease (ESRD) is a condition of the kidneys that can be caused by diabetes. It is characterized by an inability of the kidneys to carry out their normal functions of excreting wastes, concentrating urine, and conserving electrolytes. This condition may be acute or chronic, and often must be treated with dialysis or kidney transplant to prevent death.

Retinopathy is a disease of the eye. This complication is the leading cause of blindness and visual impairment in adults in developed societies.

SDEC - Standards for Diabetes Education in Canada (1995)

Secondary Diabetes Education is people who provide some diabetes education amongst many other activities in their job description (examples include acute and home care nurses, inpatient dietitians, community pharmacists).

Secondary Prevention

1. Stopping or delaying the development of the complications of a disease.
2. A level of preventative medicine that focuses on early diagnosis, use of referral services, and rapid initiation of treatment to stop the progress of a disease and prevent development of complications. This level of prevention aims to cure patients and/or reduce the more serious consequences of disease through the use of screening and treatment. It comprises the measures available to individuals and populations for early detection and prompt and effective intervention. Secondary prevention is directed at the period between the onset of disease and the normal time of diagnosis.

Tertiary prevention is aimed at reducing and minimizing the progress of complications of established disease. This type of prevention is an important aspect of therapeutic or rehabilitative medicine. Tertiary prevention consists of measures to reduce impairments and disabilities and to minimize the suffering associated with disease.

Type 1 diabetes is most often due to an autoimmune destruction of the insulin producing cells in the pancreas. Once established in the individual that person will have to take daily insulin injections to live. It usually occurs before the age of 30, but can occasionally occur at an older age. Previously called Juvenile diabetes and Insulin Dependent Diabetes Mellitus (IDDM). Ten percent of people with diabetes have Type1.

Type 2 diabetes is the most common type of diabetes, usually appears after age 40, but can occur at a younger age, especially in high-risk populations. It tends to be associated with obesity and it is not an autoimmune reaction. It can be managed with changes in diet, physical activity and monitoring blood sugar, although some may require insulin orally or by injection. Previously called Maturity-Onset Diabetes and Non-Insulin-Dependent Diabetes (NIDDM). Ninety percent of people with diabetes have Type 2.

Utilization Study Districts (USD) – Diabetes education programs in eight Health Districts that participated in a more extensive review of their programs and services.

Wholistic - In Aboriginal societies there was no word, term or expression for "health" as it is understood in Western society (Brady et al, 1997). The term wholistic embraces a "whole of life" view including physical, mental, emotional and spiritual realms.

Appendix 5

Terms of Reference Saskatchewan Advisory Committee on Diabetes

(May 23,1997)

1.0 Purpose Statement

1.1 The committee will, within two years of its first meeting:

i) Identify, summarize, review and evaluate diabetes services currently available to Saskatchewan people within the province;

ii) Recommend strategies in keeping with a population health promotion approach, for educational, preventive and treatment services addressing diabetes, which meet acceptable standards and which are feasible within available resources;

iii) Recommend research approaches aligned with the recommended services, which ultimately serve to demonstrate the efficacy and cost-effectiveness of the recommended service strategies;

iv) Identify an optimal system(s) of health service delivery for diabetics.

2.0 Functions

2.1 The committee is advisory to the Department of Health and reports directly to the Chief Medical Health Officer;

2.2 The committee will pursue the participation of individuals outside of its membership, whose input is required to fulfil its purpose;

2.3 The committee will develop a workplan and keep minutes of each meeting.

3.0 Membership

3.1 The committee will consist of representatives invited from:

- People who have diabetes;
- Aboriginal organizations;
- CDA – Saskatchewan Division;
- Diabetes Educators;
- Endocrinologists;
- Family Physicians;
- Juvenile Diabetes Foundation;
- Health Districts;
- Saskatchewan Health;
- Saskatchewan Association of Health Organizations.

3.2 The chairperson is selected by the membership.

3.3 The secretariat service is provided by Saskatchewan Health.

4.0 Commitment

4.1 The committee will meet at the call of the chair. It is anticipated the committee will meet approximately quarterly and/or subject to workplan demands.

4.2 The membership will decide the location of the meetings.

5.0 Accountability

5.1 Expenses incurred as a result of membership will be borne by respective employers or individually.

Appendix 6

Members of the Saskatchewan Advisory Committee on Diabetes

Dr. Mark Boctor (co-chair)
Professor & Head,
Division of Endocrinology,
Department of Medicine,
Royal University Hospital

Dr. Eric Young (co-chair)
Deputy Chief
Medical Health Officer,
Population Health Branch,
Saskatchewan Health

Carole Parchman
Coordinator/Secretariat
Saskatchewan Advisory
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Dr. Neil Beck (retired),
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Karen Butler
Associate Director,
MEDEC,
Regina Health District/
Urban Diabetes Educators

Karen Cooper
Public Health Nutrition
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Betty Deschamps
Diabetes Nurse Educator,
Pasquia Health District

Jim Ennis
President,
Saskatchewan Division,
Canadian Diabetes Association

Bill Grosskleg
Past President,
Saskatchewan Division,
Canadian Diabetes Association

Dr. Shauna Hudson
Medical Health Officer,
Medical Services Branch,
Health Canada

Dr. James Irvine
Medical Health Officer,
Population Health Unit,
Keewatin Yathe and Mamawetin
Churchill River Health Districts

Janice Kennedy
Health Director,
Battleford Tribal Council,
Indian Health Service

Wendi Lee
Nursing System Consultant,
Saskatchewan Association of
Health Organizations

Robert McKell
Concerned person with diabetes

Clare McNab
Past Director of Health,
Federation of Saskatchewan
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Dr. William Osei
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Saskatchewan Health

William Preston
National Board Member,
Juvenile Diabetes Association

Mary Pat Skene
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Saskatchewan Integrated Renal
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of Saskatchewan

Christine Smillie
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Brenna Stolhandske
Clinical Dietitian,
Swift Current Health District

Warren Wallin
Chief Executive Officer,
Moose Mountain District
Health Board

Judi Whiting
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Saskatchewan Division
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Dr. Cheryl Zagozeski
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Appendix 7

Members of the Working Groups Saskatchewan Advisory Committee on Diabetes

DATABASE DEVELOPMENT AND EPIDEMIOLOGY

*William Osei (chair)

*Mark Boctor

*James Irvine

*Shauna Hudson

*Christine Smillie

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Information Management Unit,
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Winanne Downey
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ABORIGINAL ISSUES

*Clare McNab (chair)

*Shauna Hudson

*James Irvine

*Janice Kennedy

*Christine Smillie

Carol Bevis
Medical Social Worker,
Dialysis Program,
Regina Health District

Lesley Brown
Assistant Regulations Nursing Officer,
Medical Services Branch,
Health Canada

Georgina Clements
Registered Nurse,
Onion Lake First Nations

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Dialysis Unit,
St. Paul's Hospital, Saskatoon

Marie Favel
Metis Nations representative,
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Nola Kornder
Diabetes Nurse Educator,
Diabetes Education Centre,
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Jan Kroll
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Cathy Miller
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Fort Qu'Appelle, Medical Services,
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Maggie Pioro
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Dr. Sara Whitehead
Medical Health Officer,
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*Eric Young

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Elaine Tyerman
Coordinator,
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*Karen Butler (co-chair)

*Christine Smillie (co-chair)

*Neil Beck

*Betty Deschamps

*Jim Ennis

*Bill Grosskleg

*Wendi Lee

*Bob McKell

*Clare McNab

*Brenna Stolhandske

*Warren Wallin

*Judi Whiting

Dean Ast
Pharmacist

Dr. Tom Best
Pediatric Endocrinologist

Heather Genik
Nutrition Services Consultant
North East Health District

Carol Straub
Diabetes Nurse Educator
Moose Jaw Thunder Creek Health District

** Member of the Saskatchewan Advisory Committee on Diabetes*